AN EPIDEMIOLOGICAL ANALYSIS OF INFECTIOUS CAUSES OF ABNORMAL VAGINAL DISCHARGE AMONG PATIENTS ATTENDING GYNAEC OP OVER A PERIOD OF ONE YEAR AT A TERTIARY CARE INSTITUTION

Dissertation submitted to
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BONAFIDE CERTIFICATE

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DECLARATION

I **Dr. R. Vidhya** solemnly declare that this dissertation **"An Epidemiological Analysis of Infectious causes of abnormal vaginal discharge among patients attending gynaec OP over a period of one year at a tertiary care institution"** was prepared by me at Government Kilpauk Medical College and Hospital, Chennai, under the guidance and supervision of **Dr. T. K. SHAANTHY GUNASINGH, M.D., D.G.O.,** Associate professor,, Department of Obstetrics and Gynaecology, Govt. Kilpauk Medical College and Hospital, Chennai.

This dissertation is submitted to **The Tamil Nadu Dr. M.G.R. Medical University, Chennai** in partial fulfilment of the University regulations for the award of the degree of **M.S. (Obstetrics and Gynaecology).**

Place: Chennai
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CONTENTS

ANNEXURES

1. INTRODUCTION

Vaginal discharge, one of the common complaints for which women approach medical care is not only a source of constant distress to women but also may be a sign of serious underlying infections that may result in adverse pregnancy outcomes like preterm labour, premature rupture of membranes and chorioamnionitis and make them prone for infection with HIV and HPV.

The prevalence of four infections which are considered as the main causes of vaginal discharge namely Bacterial Vaginosis, candidiasis, trichomonas vaginalis, gonorrhea differ in various age groups according to the risk factors present in them. An insight into the distribution of these organisms in each age group, inter association between these infections, the risk factors and the pattern of presentation helps in a long way the treating clinician in the evaluation and selection of antibiotics and in understanding the pathogenesis of these infections.

Various studies have shown that Colonization of vagina by microbes E.coli, Staphylococcus aureus and group B Streptococcus with signs of inflammation is a separate entity from the classical Bacterial Vaginosis where vagina is colonized by anaerobic microbes with absence of inflammation. This condition termed Aerobic vaginitis has been found to be more significantly associated with adverse

pregnancy outcomes than Bacterial Vaginosis. Knowledge about the Prevalence of this newly defined condition in our community will help in explaining the symptomatic culture negative patients, treatment failures and adverse pregnancy outcomes.

2.REVIEW OF LITERATURE

The normal vagina

Normal vaginal secretions are composed of vulval secretions from sebaceous glands, sweat glands, Bartholin glands and Skene glands, transudate from vaginal wall, exfoliated vaginal and cervical cells, cervical mucus, endometrial and oviductal fluids and micro organisms and their metabolic products.

The type and amount of exfoliated cells, cervical mucus and upper genital tract fluids are determined by biochemical processes that are influenced by hormonal levels. Vaginal secretions may increase in the middle of the menstrual cycle because of an increase in the amount of cervical mucus due to estrogen. Normal vaginal secretions are floccular in consistency, white in colour, and usually located in the dependent portion of vagina- posterior fornix.

The normal vaginal flora

The vagina of normal asymptomatic women of reproductive age is colonized by multiple, aerobic or facultative bacteria as well as obligates anaerobic bacteria. Of this anaerobic bacteria predominate and outnumber the aerobic organisms by atleast in the ratio 10:1.

The Lower reproductive tract bacterial floras are

- Aerobes
- Gram positive
    - Lactobacillus species
    - Diphtheroides
    - Staphylococcus epidermidis
    - Group B streptococci
    - Enterococcus faecalis
    - Staphylococcus aureus
    - Other staphylococcus species
- Gram negative
    - Escherichia species
    - Klebsiella species
    - Enterobacter species
    - Citrobacter species
    - Acinetobacter species

- Proteus species
- Pseudomonas species

- Anaerobes
- Gram positive cocci
  - Peptostreptococcus species
  - Clostridium species
- Gram positive bacilli
  - Lactobacilli species
  - Propionibacterium species
  - Eubacterium species
  - Bifido bacterium species
- Gram negative
  - Prevotella species
  - Veilonella species
  - Bacteroides species
- Candida albicans
- other Candida species

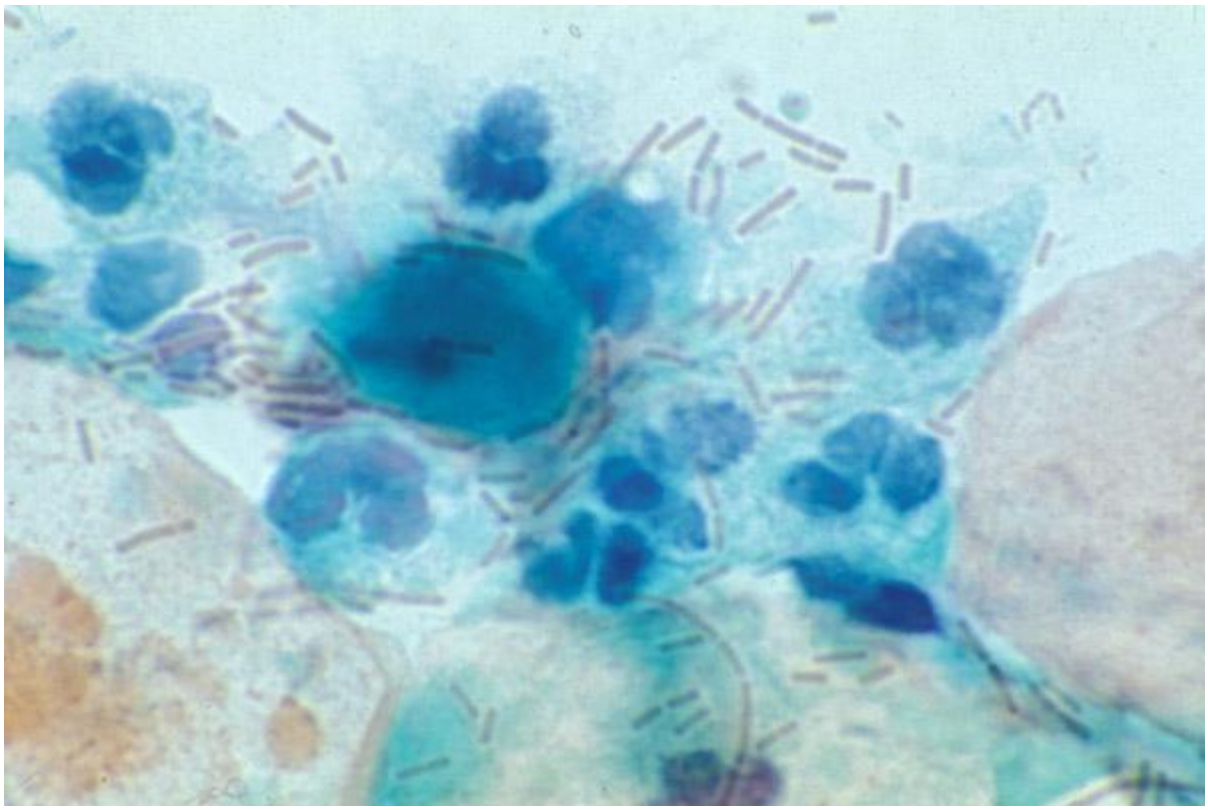

Figure 1: Lactobacilli predominant vaginal flora

A study conducted on asymptomatic reproductive age women recovered a mean of 4.2 and 2.1 bacterial species from ectocervix and andometrial cavity. Of this 17% were recovered from endometrium only and 50% were recovered from endocervix only and the remaining was recovered from both endocervix and endometrium. This shows that upper reproductive tract is accessible to certain bacteria that are normally found in the vagina.

The function and reason for colonization of vagina by bacteria remains unknown. There are studies which show that there is a symbiotic relationship between the vaginal microflora and the host and this relation is alterable depending on the micro environment. These organisms colonize in the sites where their survival needs are met and these are exempted from the infection preventing destructive capacity of the host.

Defensive mechanisms in vagina

- In this vaginal ecosystem, some microorganisms predominantly lacto bacilli produce lactic acid and hydrogen per oxide that prevents the growth of pathogenic, non indigenous micro organisms.

- There are antibacterial compounds produced by the vaginal epithelial cells called bacteriocins which inhibit the growth of pathogenic micro organisms. Examples of bacteriocins include acidocin, lactacin. Some species of bacteria secrete proteinaceous adhesion molecules that attach them to vaginal epithelial cells.

- For protection from various toxic substances produced by bacteria, vaginal epithelial cells secrete leukocyte protease inhibitory factor, which protects the vaginal epithelial lining from toxic inflammatory products and infections.

- Vaginal pH

Vaginal pH typically ranges from 4 to 4.5. This is believed to result from the lactic acid and other organic acids produced by Lactobacilli species. In addition, amino acid fermentation by anaerobic bacteria and bacterial protein catabolism also helps in maintaining the acidity of the vaginal secretions. Nutrients for micro

flora in vaginal ecosystem are provided by glycogen present in the healthy vaginal epithelial cells. Consistent with this glycogen content within the epithelial cells which depends on the estrogen levels in body decreases in menopausal women results in decreased substrate for acid production. This results in rise in vaginal pH. Cailouette and his associates shoed in their study that vaginal pH of 6 to 7.5 is strongly suggestive of menopause in the absence of associated symptoms of infection and also serum follicle stimulating hormone and vaginal acidity are positively correlated and there is an inverse relationship between the serum follicle stimulating hormone, vaginal acidity and the serum estradiol levels.

Altered microflora

Changing any of these elements may alter the type of species colonizing the vagina. This is evident from the fact that the prevalence of Lactobacilli in the vagina of post menopausal women not receiving hormone replacement therapy and young girls is low compared to that of reproductive age women. Devillard and his associates in their study showed that hormone replacement therapy restored the

lactobacilli predominant vaginal flora which protected them against infective pathogens.

Normal vaginal flora is also altered by the menstrual cycle. These are transient changes, occurring predominantly in the first part of the cycle and hence presumed to be due to the hormonal changes.

There are other events that may alter the bacterial flora resulting in infection. These are treatment with broad spectrum antibiotics that destroys the normal vaginal flora and menstruation that washes out these bacteria. Menstrual fluid can serve as a source of nutrients for many bacterial species that will result in their overgrowth. Hysterectomy where cervix is removed results in the change of microbial flora of the lower reproductive tract with or without antibiotic therapy. There is an increase in the concentration of anaerobic species in the vagina post operatively with a particular increase in the concentration of Bacteroides fragilis. There is also an increase in the concentration of Escherichia and Enterobacter species. These are the three species which are frequently cultured from vagina of patients with post operative pelvic infections.

Examination of vaginal secretions

Wet mount preparation

A sample of vaginal secretions is suspended in 0.5ml of normal saline in a tube, transferred to a slide, covered with a slide, and assessed by microscopy. Slides can also be prepared by suspending secretions in saline placed directly on the slide. Microscopy of normal vaginal secretions reveals many superficial epithelial cells, few white blood cells (less than 1 per epithelial cell), and few, if any clue cells. Clue cells are superficial vaginal epithelial cells with adherent bacteria, usually Gardnerella vaginalis, which obliterates the crisp cell border when visualized microscopically.

Potassium hydroxide preparation

Few drops of 10% potassium hydroxide are added to the slide to examine the secretions for evidence of fungal elements. In case of Bacterial Vaginosis, addition of KOH results in the release of amines that have characteristic fishy odour which helps in the diagnosis of the condition.

Gram staining

Smear made with vaginal secretions placed on a slide. After heat fixing the smear, flood slide with crystal violet, rinse the excess agent with tap water, flood the slide with iodine, rinse the excess iodine with tap water, decolourise using alcohol / acetone, flood the slide with carbol fuchsin, rinse excess reagent, air dry the smear and examine the slide under microscope.

Neisseria gonorrhoeae - typical intracellular gram negative diplococci

Candida albicans - gram positive budding yeast cells with pseudo hyphae

Culture

Neisseria gonorrhoeae - McLeod's chocolate agar medium

E.coli, Staphylococcus aureus, Streptococci- blood agar medium

Candida albicans- sabourauds agar medium

Bacterial vaginosis

It is an alteration in normal vaginal bacteria that results in the loss of hydrogen peroxide producing lactobacilli and an overgrowth of predominantly

anaerobic bacteria that includes Gardnerella vaginalis, Ureaplasma urealyticum, Moniluncus species, Mycoplasma hominis, and Prevotella species. In normal women anaerobic bacteria can be found less than 1% of normal flora. In women with Bacterial Vaginosis, however the concentration of anaerobes gardnerella vaginalis and mycoplasma hominis is 100 to 1000 times higher than in normal women. Lactobacilli are usually absent. Whether an alteration in the ecosystem leads to lactobacilli disappearance or its disappearance results in the changes observed in lactobacilli is not known.

This has been variously termed and the older terms include Haemophilus vaginitis, Corynebacterium vaginitis, Gardnerella vaginitis, anaerobic vaginitis and non specific vaginitis.

Predisposing factors

This condition is not considered by the Centre for Disease Control and prevention as a sexually transmitted disease and it has been seen in women without sexual exposure. However many risk factors are associated with sexual activity and increased incidence of sexually transmitted diseases is seen in women affected with Bacterial Vaginosis.

- Repeated alkalinisation of vagina which occurs with frequent sexual intercourse
- Oral sex
- Black race
- Cigarette smoking
- Washing out by menstrual blood
- Use of douches
- Use of IUCD

Clinical features

The patients present with a homogenous, white, non viscous, malodourous uniformly adherent vaginal discharge. The discharge may be profuse enough to be seen at the labia. When other infections like trichomonas and candida are associated which they most often the picture may be modified.

Complications

Numerous studies show an association of Bacterial Vaginosis with significant adverse sequelae. Women with Bacterial Vaginosis are at increased risk for

- pelvic inflammatory disease
- post abortal PID
- post hysterectomy cuff infections
- abnormal cervical cytology
- premature rupture of membranes
- preterm labour
- chorioamnionitis
- post caesarean endometritis

Diagnosis

Diagnosis of Bacterial Vaginosis can be achieved by simple lab procedures combination of clinical examination and simple lab procedures.

Amsel Criteria

Diagnosis of bacterial vaginosis is made when three of the following four criteria are satisfied. .

- ✓ Vaginal discharge
- ✓ pH of the secretion higher than 4.5

- ✓ Microscopy revealing increased number of clue cells and leukocytes are conspicuously absent. Clue cells are vaginal epithelial cells whose borders appear obscured by the numerous Gardnerella bacilli that are adherent to the epithelial cell wall.
- ✓ Addition of KOH to the vaginal secretions releases fishy odour due to the release of amines.

Nugent scoring

This is based on gram staining of the vaginal secretions of the patient. Number of organisms visualized per high power field in microscope after gram staining the vaginal smear. The advantage of this scoring system is it has low inter-observer variability and high reproductivity. Hence it is mostly used for research purposes.

Lactobacilli morphotype - large gram positive rods

Gardnerella morphotype - small gram negative or gram variable rods

Mobiluncus morphotype – curved gram negative to gram variable rods

Nugent score	Lactobacilli morphotype per field	Gardnerella morphotype per field	Mobiluncus morphotype per field
0	> 30	0	0
1	5 to 30	< 1	1 to 5
2	1 to 4	1 to 4	> 5
3	< 1	5 to 30	
4	0	> 30	

Table 1: Nugent Scoring

Here N score = the sum of the scores for each bacterial morphocyte listed above.

If N score is	Clue cells	Report
0 to 3		Not consistent with Bacterial Vaginosis
4 to 6	Absent	Not consistent with Bacterial Vaginosis

4 to 6	Present	Consistent with Bacterial Vaginosis
> 7		Consistent with Bacterial Vaginosis

Table 2: Interpretation of Nugent Scoring

Hay / Ison criteria

- Grade 1 – lactobacilli predominate
- Grade 2 – mixed flora with lactobacilli and Gardnerella and mobiluncus morphocytes also present
- Grade 3 – predominantly Gardnerella or Mobiluncus morphocyte seen. Few or absent lactobacilli.

Culture

Culture is not a diagnostic method for Bacterial Vaginosis as micro organisms associated with Bacterial Vaginosis namely Gardnerella vaginalis; Mobiluncus can also be cultured from normal vagina.

Figure 2: Vaginal epithelial cells studded with anaerobic bacilli – clue cell seen in wet mount preparation

Treatment

Ideally, treatment of Bacterial Vaginosis should inhibit anaerobes but not vaginal lactobacilli. The following treatments are effective:

- Metronidazole

An antibiotic with excellent activity against anaerobes but poor activity against lactobacilli is the drug of choice for the treatment of Bacterial Vaginosis

Dosage: orally, 500mg administered twice daily for 7 days.

Metronidazole gel 0.75%, one applicator intravaginally, once daily for five days may also be prescribed.

The overall cure rate ranges from 75% to 84% with the aforementioned regimens.

- Clindamycin

Clindamycin in the following regimens is effective in treating Bacterial Vaginosis.

1. Clindamycin ovules, 100mg, intra vaginally once at bedtime for 3 days.

2. Clindamycin bioadhesive cream, 2% 100 mg intravaginally in a single dose.

3. Clindamycin cream, 2% one applicator full intravaginally at bedtime for 7 days.

4. Clindamycin, 300 mg, orally twice daily for 7 days.

Intravaginal treatment is preferred to avoid systemic side effects such as mild to moderate gastrointestinal upset and unpleasant taste.

Treatment of the male sexual partner does not improve therapeutic response and therefore is not recommended.

Role of probiotics

Studies have shown that probiotics are highly effective given alone or in combination with antibiotics. They can be given orally or intravaginally.

Studies have also shown that use of probiotics can be effective in the prevention of recurrences. One study has shown that topical application of the probiotic once a week for 6 months is effective in almost complete prevention of recurrence in the study group and is still effective for 12 months. Cochrane review in 2009 is neutral about the use of probiotics in the treatment of Bacterial Vaginosis.

Candidal vaginitis

An estimated 75% of women experience atleast one episode of vulvovaginal candidiasis during their lifetimes.

Candida albicans is responsible for 85% to 90% of vaginal infections. Other species of candida such as C.glabrata and C.tropicalis can cause vulvovaginal symptoms and tend to be resistant to therapy.

Candida are dimorphic fungi existing as blastospores, which are responsible for transmission and asymptomatic colonization and as mycelia, which result from blastospore germination and enhance colonization and facilitate tissue invasion.

Pathogenesis

The extensive areas of pruritus and inflammation often associated with minimal invasion of the lower genital tract epithelial cells suggest that an extracellular toxin or enzyme may play a role in the pathogenesis of the disease.

A hypersensitivity phenomenon may be responsible for the irritative symptoms.

Patients with symptomatic disease usually have an increased concentration of these micro-organisms (>10^4 per ml) compared with asymptomatic infections (10^3 per ml).

Predisposing factors

- Antibiotic use
- pregnancy
- diabetes

Pregnancy and diabetes are associated with a qualitative decrease in cell mediated immunity, leading to a higher incidence of candidiasis.

Clinical features

The symptoms consist of vulval pruritus associated with a vaginal discharge that typically resemblance cottage cheese. The discharge can vary watery to homogeneously thick.

Vaginal soreness, dyspareunia, vulval burning and irritation may be present.

External dysuria (splash dysuria) when micturition leads to exposure of inflammed vulval and vestibular epithelium to urine.

Examination reveals erythema and edema of the labia and vulval skin. Discrete pustulopapular peripheral lesions may be present. The vagina may be erythematous with adherent white discharge. The cervix appears normal.

Diagnosis

- KOH preparation shows budding yeast cells with pseudohyphae.
- Saline preparation usually is normal although there may be a slight increase in the inflammatory cells in severe cases.
- The pH of the vagina in patients is usually normal(<4.5)
- The whiff test is negative

A presumptive diagnosis is made in the absence of fungal elements confirmed by microscopy if the pH and the results of saline preparation evaluation are normal and the patient has increased erythema based on examination of vulva and vagina.

A fungal culture is recommended to confirm the diagnosis.

Conversely, women with a normal physical examination findings and no evidence of fungal elements disclosed by microscopy are unlikely to have vulvovaginal candidiasis and should not be empirically treated unless a vaginal yeast culture is positive.

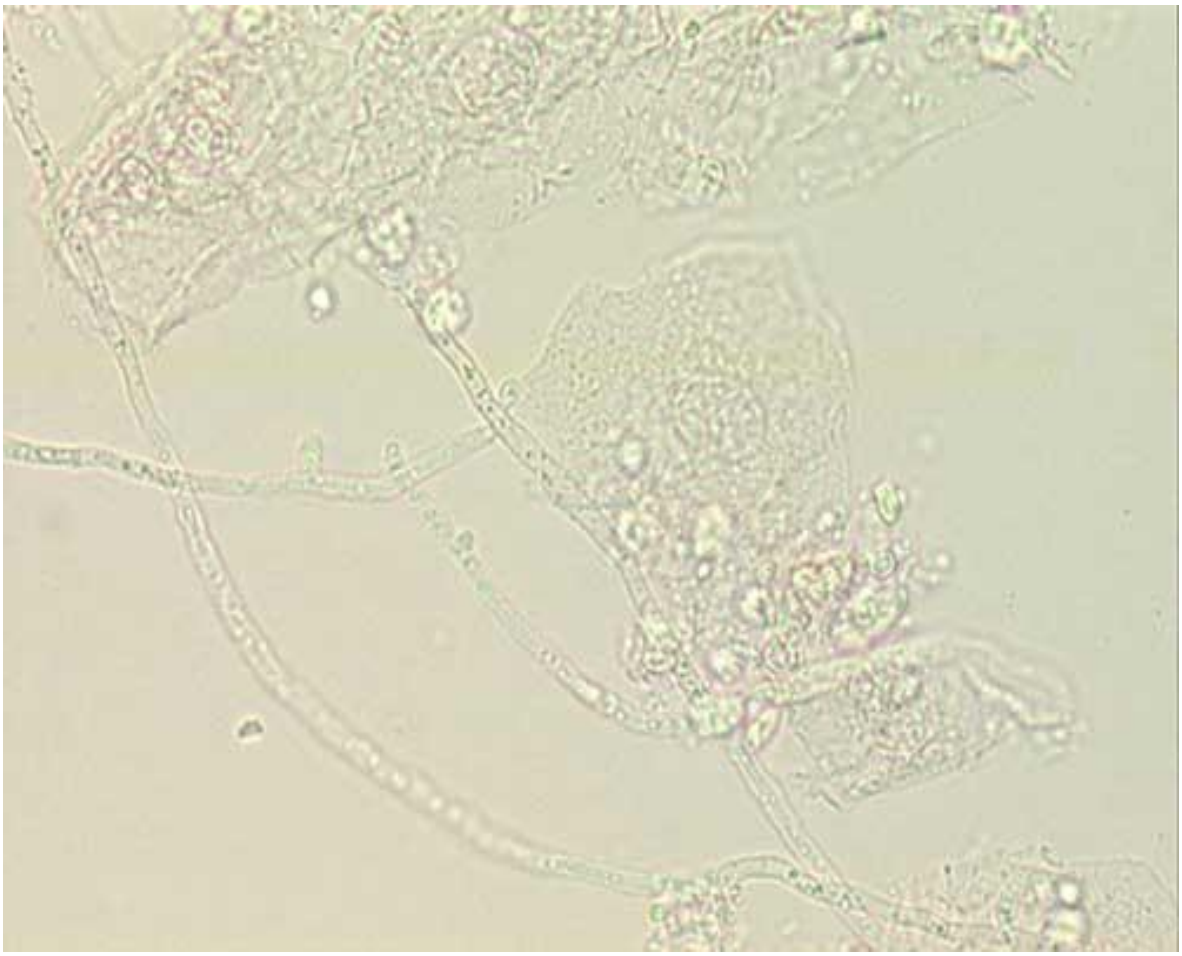

Figure 3: ***Pseudo-hyphae with budding yeast cells seen in KOH preparation***

Treatment

Topically applied azole drugs are the most commonly available treatment for vulvovaginal candidiasis. Treatment with azoles results in relief of symptoms and negative cultures in 80%to 90% of patients who have completed therapy. Symptoms usually resolve in 2 to 3 days. Short course regimens upto 3 days is effective. Although the shorter period of therapy implies a shortened duration of

treatment, the short course formulations have higher concentrations of the antifungal agent, causing an inhibitory concentration in the vagina that persists for several days.

The oral antifungal agent, fluconazole used in a single 150mg dose is recommended for the vaginal candidiasis. It appears to have equal efficacy when compared with topical azoles in the treatment of mild to moderate vaginal candidiasis. Patients should be explained that their symptoms will persist for 2 to 3 days so they will not expect additional treatment.

Women with complicated vaginal candidiasis benefit from an additional 150 mg dose of fluconazole given 72 hours after the first dose. Patients with complications can be treated with a more prolonged topical regimen lasting 10 to 14 days. Adjuvant treatment with a weak topical steroid such as 1% hydrocortisone cream may be helpful in relieving some of the external irritative symptoms.

Other Candidal species

Vaginitis has been also reported to be caused by other species of Candida like Candida glabrata, Candida tropicalis. These species are responsible drug resistant infections.

Trichomonas vaginitis

Trichomonas Vaginitis is caused by the sexually transmitted, flagellated parasite, Trichomonas vaginalis. The transmission rate is high; 70% of men contract the disease after a single exposure to an infected woman, which suggests that the rate of male to female transmission is even higher.

Pathogenesis

Trichomonas vaginalis is an ovoid motile flagellated parasite 15 to 20 micrometer in length and 8 to 10 micrometer in width although smaller forms are described. It has four anterior flagella and an axostyle which traverses its body to end in a spike.

The infection is essentially of the vaginal epithelium and the parasite shelter between the rugae. It is possible that they may penetrate between the surface cells but no deeper and they induce usual inflammatory reaction.

In 70 to 80 % of cases the trichomonads can also be cultured from the urethra, where they cause acute or chronic urethritis. Bartholin's glands and Skene's tubules are sometimes infected.

There are reliable reports of the organisms having been found in the cervix, body of uterus, the fallopian tubes and even in the blood stream but their significance in these sites is questionable.

Clinical features

The first symptom is usually sudden onset of purulent vaginal discharge often dating from menstruation. It is said to be cream colored and frothy but its physical characteristics vary widely. It may be profuse or scanty.

The most constant feature is that it causes pruritus, the itching being felt around and within the introitus.

At the outset dysuria and frequency of urine are also common complaints.

Vaginal tenderness and congestion result in dyspareunia.

On examination,

- In acute stage the labia minora and introitus are sometimes edematous.
- The vagina may be diffusely fiery red in colour but often presents a strawberry appearance which, on cervix can be confused with erosion.
- The external urethral meatus is congested and pouting.

- Later or when the reactions are less severe the disease is manifested by a granular appearance which is most obvious in the fornices, on the portio vaginalis, and around the urethral orifice.

The infection can become very chronic with pruritus more prominent than discharge, and is subject to periodic exacerbations over the course of many years. The same is true for urethritis. So recurrent cystitis in women is very often explained by flare ups of a persistent Trichomonas urethritis.

Diagnosis

Wet smear can be made in the office. Specimens, uncontaminated by lubricant are taken from the vagina by a swab or pipette and examined microscopically. For this purpose the material is mixed with saline solution on a warm slide, covered with a glass slip and left unstained. The trichomonads are recognized by their shape, size, - larger than a pus cell but less than half the size of a vaginal squame.

Culture

Culture methods are more accurate. The specimen of discharge or preferably the whole cotton tip of the swab is added immediately to a small tube of

Kupferberg's medium or Feinberg-Whittington medium. The latter is a proteolised liver and inactivated horse serum preparation with streptomycin and penicillin added. It eliminates all organisms except Trichomonas and candida. Incubation preferably at 34degree rather than 37 degree is followed by examination of drops of fluid for organism at 24 and 48 hours and if needed later. It is the only method reliable in males.

The finding of Trichomonas indicates a need to exclude gonorrhea as well. Candida and Trichomonas infestations also commonly coexist but the dual nature of the infection is not always evident until the dominant organism – Trichomonas is eliminated. The persistence of symptoms after with Trichomonacides therefore calls for repeated cultures for both Candida and gonococci.

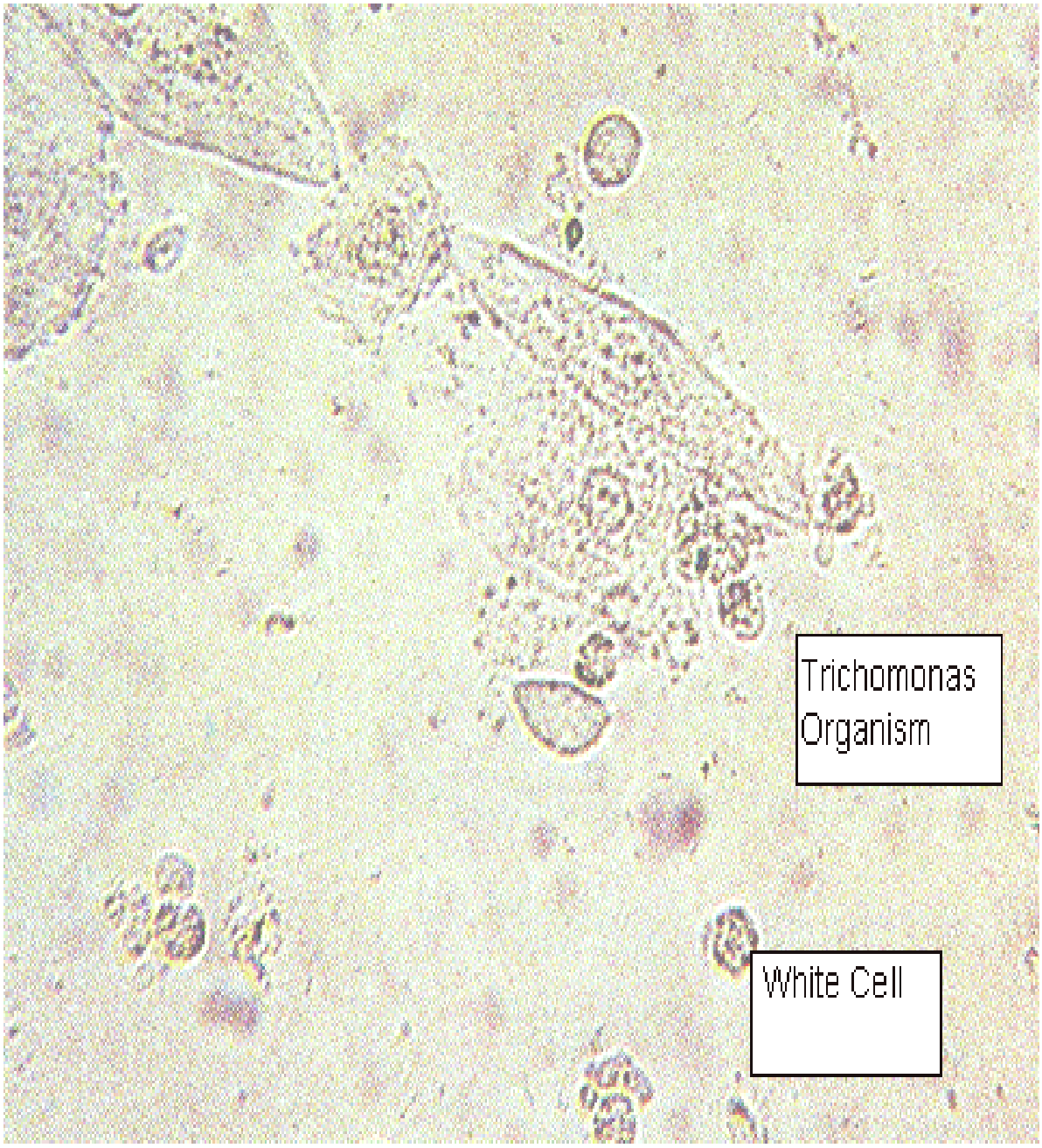

Figure 4: ***Flagellated Trichomonas organism with leukocyte infiltration seen in wet mount preparation***

Treatment

Metronidazole is the drug of choice for treatment of vaginal trichomoniasis. Both a single dose 2gm orally and a multi dose 500mg twice daily for 7 days regimens are highly effective and have cure rates of about 95%

Women who do not respond to initial therapy should be treated again with 500mg twice daily for 7 days. If repeated treatment is not effective the patient should be treated with a single 2g dose of metronidazole once daily for 5 days or tinidazole 2gm in a single dose for 5 days.

In patients who do not respond to repeated treatment with metronidazole and tinidazole culture of the parasite has to be done to identify the sensitivity of the organism.

Treatment of sexual partner is mandatory in case of infection with Trichomonas vaginalis failing which recurrences are common.

Gonorrhoea

Gonorrhea is an infection caused by a gram negative diplococcus – Neisseria gonorrhoeae and in the adult women contracted by sexual contact. Transfer through other means is a theoretical possibility except in babies whom can be infected in their passage through the vaginal canal which will result in ophthalmia neonatorum.

Pathogenesis

The bacteria first attack those tissues of the lower genital tract which are not covered by squamous epithelium- the endocervix, the urethra including paraurethral tubules, the ducts and acini if bartholins glands. Gonococci also spread commonly to anorectum which are implanted there during anal coitus.

Generally, the infection remains confined to lower genital tract but in 10% of proven cases of gonorrhea it spreads upwards to cause salpingo oophoritis of varying degree. The organisms ascend through the uterus to the tubes producing a fleeting acute endometritis on the way which is clinically not evident being overshadowed by the symptoms of salpingitis. Both tubes are always involved and the essential lesion is endosalpingitis. The organisms spread via the abdominal ostia to produce pelvic peritonitis and salpingitis. Generalized peritonitis is rare.

The most important and tragic sequel to gonorrhea is tubal damage and closure which will threaten future reproduction.

Chronic infection

No matter whether it has a dramatic or quiet onset, gonorrhoea persists as a chronic but contagious disease for many years. The organisms linger in endocervix, bartholins glands, periurethral tubules and rectum but give rise to no symptoms or at most to a slight degree of chronic mucopurulent vaginal discharge.

Diagnosis

In the classical case, the diagnosis of gonorrhea is usually suggested by the history of exposure, the acuteness of the onset of a purulent discharge, the associated urethritis, and the appearance of zones of congestion (maculae) around the orifices of Bartholin's ducts. In practice, it is the occurrence of urethritis in the patient's consort which often brings the woman to investigation, she herself having no symptoms.

Sixty percent of women with proven gonorrhea also suffer from Trichomonas vaginalis and/or Chlamydia trachomatis. Candida albicans, herpes

simplex virus, etc. are also associated. So the disease should be suspected whenever there is a complaint of vaginal discharge.

The diagnosis can only be proved by the demonstration of gonococci in the genital tract secretions or in the lower rectum. In the female it is rare to find typical Gram-negative intracellular diplococcic in direct smears of vaginal discharge, unless a very acute infection is present. The setting up of cultures is therefore mandatory and material for these is obtained from the endocervical canal. Cultures of the urethra, anal canal and pharynx are recommended, but produce only a slight increase in the yield. When gonococcal septicaemia, pharyngitis or arthritis is suspected, it is necessary also to prepare cultures from blood, throat swabs and synovial fluid. Gonococci will survive on ordinary swabs for approximately 2 hours. A longer interval than this between the collection of specimens and their arrival in the laboratory means the use of transport media such as Stuart's agar and crystal violet, or one of the proprietary preparations in the market. Alternatively, plates of warmed chocolate agar or of Thayer – Martin medium can be inoculated directly by the patient's bedside.

The woman should not have passed urine or used a douche before examination. Having wiped its orifice clean, the urethra is milked to obtain discharge from the paraurethral glands. Further material is obtained by milking Bartholin's glands and their ducts. Swabs are next taken from the endocervix and

finally from the anal canal and rectum. In proven cases of gonorrhea, the organisms are found in Bartholin's ducts in 30 percent, in the endocervix in 90 percent and in the rectum in 50-60 percent. The last two are therefore the most important sites to study and it is stated that a combination of their findings provides an almost 100 percent accurate diagnostic test.

Nevertheless, negative findings, even when repeated, are never conclusive and it is impossible to be certain that a woman does not have gonorrhoea.

Similarly, tests of cure are unsatisfactory although negative bacteriological findings on three occasions are the accepted criteria. The best time to perform these is immediately after menstruation. Enzyme-linked immunosorbent assay (ELISA) tests have been developed which offer greater reliability.

Whenever gonorrhoea is diagnosed or suspected, it is essential to entertain the possibility of the patient having contracted syphilis at the same time. The case must therefore also be investigated from this stand-point and, meanwhile, no treatment given which might mask, without curing, the disease.

Antibiotic sensitivity of the organism is becoming important because of the resistant or less sensitive strains. The detection of penicillinase-producing strains of N.gonorrhoea which are totally resistant to penicillin and relatively insensitive

to several other antibiotics is important as these strains are spreading throughout the world.

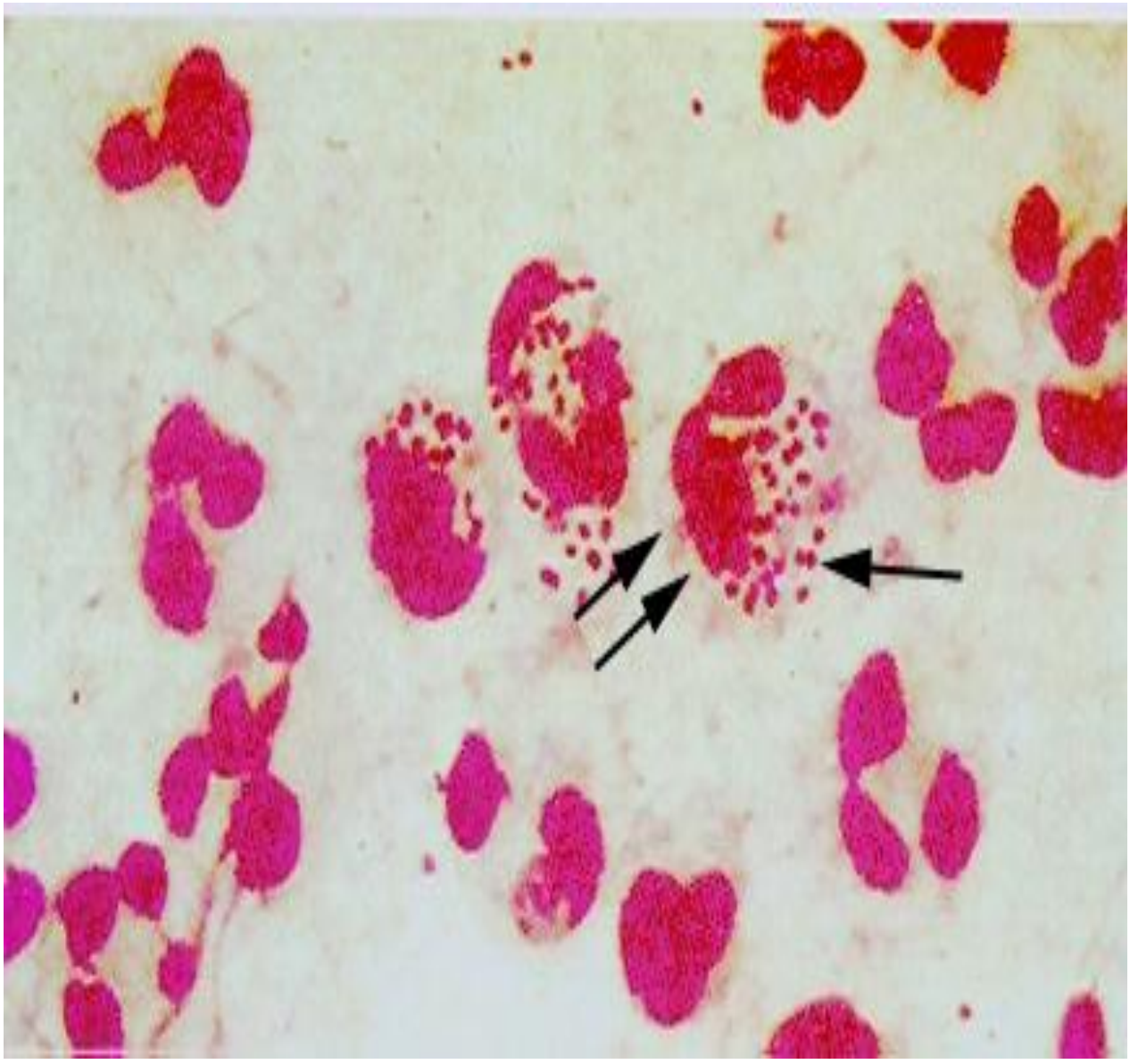

Figure 5: ***Gram stain showing intra-cellular gram negative diplococci***

Treatment

If there is a severe systemic reaction, or if acute salpingitis is present, the patient should be put completely at rest in hospital and given intensive antibiotic therapy in divided doses. Otherwise she can remain ambulant but should be warned against coitus until pronounced cured. Except for the drainage of an abscess, local treatment should be avoided lest it encourage the spread of infection.

Penicillin used to be remedy of choice in gonorrhoea. A single intramuscular injection of 4.8 mega units of procaine penicillin can be curative but the emergence of penicillinase-producing strains of N.gonorrohoea led to the use of other agents. Further, some authorities felt that this dosage was inadequate in case of concomitant syphilis. Although, in general, this is very rare nowadays, there may be some settings where this is relevant.

Several of the newer quinolones, e.g. ciprofloxacin and ofloxacin have been used successfully as single-dose regimens, 500mg and 400mg, respectively. Quinolone resistant strains have emerged in some Pacific and Asian countries, but CDC continues to recommend these in areas where there is no problem of resistance. However, quinolones should not be used in pregnant women.

Ceftriaxone is recommended by CDC for the treatment of uncomplicated gonorrhoea in a single intramuscular injection of 125mg. It cures rectal and

pharyngeal gonorrhoea as well. Some patients allergic to beta-lactam antibiotics may show reaction - cefixime is a useful oral alternative. Spectinomycin, 4g in a single intramuscular injection, is useful in treating anogenital gonorrhoea but does not treat pharyngeal gonorrhoea.

Aerobic vaginitis

Vaginal microflora which is a complicated environment is made of varying organisms in varying proportions. Whereas the diagnosis of Bacterial Vaginosis is straight forward with Amsels criteria or Nugents scoring with gram staining as is the normal lactobacilli dominant vaginal flora, there is also another type of abnormal flora that could neither be called Bacterial Vaginosis nor as normal. Studies have shown that this type of flora termed Aerobic vaginitis is more closely associated with adverse pregnancy outcomes and is different from Bacterial Vaginosis in aetiology, pathogenesis, clinical presentation and treatment.

Aetiology

Replacement of normal hydrogen peroxide producing lactobacilli by aerobic bacteria like E.coli, Staphylococcus aureus, group B Streptococcus results in Aerobic Vaginitis. Measurement of lactic acid in vaginal secretions is low in both

Bacterial Vaginosis and Aerobic Vaginitis due to absence of lactobacilli but the levels of succinate in vaginal secretions is high in Bacterial Vaginosis as it is produced by gardnerella vaginalis and not by aerobic organisms causing Aerobic Vaginitis.

Pathogenesis

Whereas wet mount preparation in Bacterial Vaginosis is by absence of signs of inflammation with no leukocyte infiltration, in Aerobic Vaginitis, there is leukocyte infiltration. This is also evident from the high concentration of inflammatory markers like IL1, IL6, and leukemia inhibitory factor in vaginal secretions of patients with the diagnosis of Aerobic Vaginitis than in patients with Bacterial Vaginosis.

Clinical features

- Patient presents with yellowish discharge.
- An offensive odour is usually present not fishy odour but more of a foul smelling rotten odour. Itching is rare.
- On examination vagina will appear red and inflamed, may even show small to large ulcerations

Diagnosis

Aerobic vaginitis can be diagnosed from microscopic examination.

AV score	LBG	No of leukocytes	Proportion of leukocytes	Background flora	Proportion of PBC
0	I and IIa	≤10/ hpf	None or sporadic	Unremarkable or cytolysis	None or < 1%
1	IIb	>10/hpf and ≤ 10/epithelial cell	≤ 50% of leukocytes	Small coliform bacilli	≤ 10%
2	III	> 10/epithelial cell	> 50% of leukocytes	Cocci or chains	>10%

Table 3: Aerobic Vaginitis scoring

I - normal lactobacilli predominant slide

IIa - mixed infection with lactobacilli as prominent flora

IIb - mixed infection with decreased lactobacilli

IIIc - mixed infection with no lactobacilli

Aerobic vaginitis scoring

0 to 3 – no sign of Aerobic Vaginitis

3 to 4 – minimal Aerobic Vaginitis

5 to 6 – moderate Aerobic Vaginitis

>6 – severe Aerobic Vaginitis

Treatment

- Topical kanamycin has been advocated as the treatment for Aerobic Vaginitis
- Topical clindamycin can also be used
- Metronidazole is not useful in contrast to Bacterial Vaginosis for which drug of choice is metronidazole.

Purulent vaginitis

Also called streptococcal vaginitis

Can be considered as the extreme form of Aerobic Vaginitis

Caused by Group B Streptococci

Cytolytic vaginosis

This is a clinical condition where lactobacilli become invasive and invades the vagina resulting in inflammation.

Cause of this condition is yet to be defined.

Kulkarni et al[1] did a study involving 506 females in Nagpur. Prevalence of white discharge in them was 27.47% (139). 35.29% of patients with complaints were married. It also studied the effect of low socio economic condition.

Desai et al[2], in their study found that 31% of females participated in their study had complaints of white discharge.

Parashari et al[3] in their study found that prevalence of white discharge to be 70.1%. Of this, the married population was 35.29%.

Snehalatha Vishwanath et al[4], in their study involving 319 women, Bacterial Vaginosis is more common with prevalence around 26% prevalence of Chlamydia 12.2%, Trichomonas 10%, no gonorrhoea isolated.

Vikram Patel et al[5] in his study involving 2494 women, only 14.5% had abnormal white discharge. Somatoform disorders and IUCD use are positively associated with infection and low literacy and age more than 40 years are negatively associated with infections.

Kaven Trollope Kumar in their study found that only 30% of women with complaints of white discharge are positive for infections in south Asian population.

International family planning perspectives in their study Found that 38% of patients with white discharge had infections.53% of these patients had associated gynecologic symptoms.

RD Caterall et al[6] in his study on Diagnosis of vaginal discharge, of the 300 women included in the study, Trichomonas Vaginitis was found to be the most common cause-41.6%. Prevalence of candidal infection is 34%, of gonococci 31.6%, 4 cases of senile vaginitis in postmenopausal women studied. There were 3 cases of non invasive cervical cancer, 2 cases of invasive cervical cancer, 6 cases of benign cervical polyp, 8 cases of foreign body which could be forgotten tampons or IUCDs.

Pierce AM et al[7] in their study stated that major causes of vaginal discharge in prepubertal and pubertal age group are poor hygiene, thread worm infestation, sexual abuse and dermatologic conditions.

Arsenio Spinillo et al[8] in their study on the relationship vaginal infections between reproductive age group and post menopausal group found that incidence of candida and Trichomonas in reproductive age group are 34.1% and 1.92% respectively and that of postmenopausal women are 3.5% and 10.8% respectively. Prevalence of Bacterial Vaginosis is common in both groups. 30% of postmenopausal patients

with complaints of white discharge were positive for infections. Other causes seen were estrogen deficiency, local irritants, allergens, dermatologic conditions.

Mirza NB et al[9] in their study on microbiology of vaginal discharge found that prevalence of Gonorrhoea – 26%; Trichomonas Vaginitis – 34%; Candida – 24%; Bacterial Vaginosis – 25% and mixed infections of atleast two organisms are seen in 23% of patients.

Faye-kette-YH[10] et al in their study on 6603 women with white discharge found that prevalence of Candida albicans to be 25%; Bacterial Vaginosis – 17.4%; Trichomonas Vaginitis – 8.2% and Gonorrhoea – 3.2%

Abauleth et al[11] in their 7 month prospective descriptive study from October 2003 to 2004 found that the prevalence of individual organisms to be Bacterial Vaginosis – 47%; Candida – 29.4%; Trichomonas Vaginitis – 6.9%; Gonorrhoea – 2.9%

Lobb Phillipon M et al[12] in their survey on 579 patients with white discharge, the prevalence was found to be Gonorrhoea – 64.4%; Bacterial Vaginosis – 24%; Candida – 20%; Trichomonas Vaginitis – 14%

Santhosh Chaturvedi et al[13] in his study on psycho somatic syndrome, 40% of patients with psycho somatic symptoms had white discharge and they attributed their illness to abnormal white discharge PV.

Donders et al[14] in his study in 2003 on 631 women with white discharge proved that there is a separate entity from Bacterial Vaginosis that differs from Bacterial Vaginosis in aetiology, pathogenesis, clinical presentation and treatment. This study also showed that this condition termed Aerobic Vaginitis can result in adverse pregnancy sequel compared to Bacterial Vaginosis due to associated inflammation in this condition which is conspicuously absent in patients with Bacterial Vaginosis.

Donders et al[15] in 2009, in another study showed that abnormal vaginal flora characterized by colonization by aerobic bacteria like E.coli, Staphylococcus aureus, group B streptococci with associated signs of inflammation proved by increased concentration of inflammatory cytokines in vaginal secretions and leukocyte infiltration on microscopy before 14 weeks of gestation is a risk factor for preterm labour and delivery and prophylactic antibiotics in such patients may aid in preventing this adverse pregnancy outcome.

3. AIM

To analyse the epidemiological pattern of infectious causes of abnormal white discharge and to identify the prevalence, patient characteristics, pattern of presentation, risk factors for the newer condition Aerobic Vaginitis in our community.

4. MATERIALS AND METHODS

Study design

Cross-sectional Analytical study

Period of study

September 2012 to September 2013

Place of study

Gynaecology outpatient department, Kilpauk medical college hospital

Inclusion criteria

Women attending gynaecology OP with complaints of abnormal vaginal discharge from September 2012 to September 2013 without the below mentioned criteria for exclusion.

Exclusion criteria

- Cervicitis/cervical dysplasia/cervical neoplasia
- Endometrial/cervical polyp

- H/O recent obstetric/gynaec intervention
- Pregnancy

Sample size

The sample size was calculated using the formula,

$$n = \frac{Z\,2 \ * \ P\,(1 - P)}{d2}$$

Z - Constant (1.96).

P - Prevalence (18%).

d - Desired precision (0.05).

By using this formula, *n* comes to 226 and the sample size for my study is 232.

Method

Of all women attending gynaec OP with complaints of white discharge per vaginum from September 2012 to September 2013, 232 were randomly selected for study after getting written consent.

Detailed history comprising age of the patient, marital status, menstrual history, parity, and history of any recent obstetric or gynaec intervention, h/o diabetes elicited.

Patients subjected to clinical examination that includes per abdomen examination, local examination of external genitalia.

Vaginal discharge collected with cotton swabs subjected to microscopic examination with KOH and on wet mount, gram staining, pH analysis, and whiff test.

Diagnosis of Bacterial Vaginosis, candidal vaginitis, vaginitis due to trichomonas vaginalis, gonorrhea and Aerobic Vaginitis were made by following definitions.

Bacterial vaginosis

When 3 out of 4 of Amsel criteria are present

- ✓ Vaginal discharge
- ✓ Elevated pH > 4.5
- ✓ Clue cells on wet mount preparation
- ✓ Fishy odour on adding 10% KOH solution

Vaginal candidiasis

Fungal culture with Sabouraud's agar medium

Trichomonas Vaginitis

Presence of flagellated motile organism with wet mount preparation

Gonococcal infection

Positive culture on McLeod's chocolate agar medium

Aerobic vaginitis

Culture positive for E.coli, group B streptococci, Staphylococcus, Aerobic Vaginitis scoring > 3

Analysis

Women were divided into six age groups

- Group 1 - 10 to 19
- Group 2 - 20 to 29
- Group 3 - 30 to 39
- Group 4 - 40 to 49
- Group 5 - 50to 59
- Group 6 - 60 to 69

Women were divided into four categories as on the basis of menstrual status

1. Pubertal age category- attained menarche, below 18 years and not sexually active.

2. Sexually active women in reproductive age category- 18 to 35 years

3. Perimenopausal age category – 45 to 52 years

4. Postmenopausal age category – one year after the cessation of menses.

The distribution of organism positive smears studied in each group and the prevalence of each type of infection and prevalence of mixed infections in those groups studied.

Characteristics of the patients marital status, presence of pruritus, UTI symptoms namely increased frequency, painful micturition, H/O diabetes mellitus (DM) studied as prevalence in smear positive patients, percentage of symptom positive patients in each organism group and their significance to identify if pattern of presentation can aid in deciding further evaluation and treatment of the patient.

The prevalence of the newer entity Aerobic Vaginitis in our population is also studied. Patient characteristics in Aerobic Vaginitis group which may help in understanding the pattern of presentation and risk factors of this newer diagnosis in our community is also studied.

Statistical analysis is done by chi square test for discrete variables in the study.

P value less than 0.05 is considered statistically significant.

5. RESULTS OF THE STUDY

Of the 232 patients who attended gynaec OP with complaints of white discharge, 128 patients (55.1%) had their smears positive for the infections studied.

Age Distribution

Table 4 - Age distribution of symptomatic and infection positive cases

Age Group	Number of Patients in the Age Group	Percentage of Patients in the Age Group	Smear positive Patients in the Age Group	Percentage of smear positive patients in the Age Group
10-19	20	8.6 %	6	30 %
20-29	83	35.8 %	49	59 %
30-39	12	5.2 %	9	75 %
40-49	51	22 %	28	54.9 %
50-59	37	15.9 %	19	51.4 %
60-69	29	12.5 %	17	58.6 %
Total	232		128	

Inference

- Of the patients coming with complaints of white discharge in our OP, 35.8% belonged to age group 20 to 29.
- Least prevalence is seen in age group 30 to 39, followed by age group 10 to 19.
- 75% of patients with white discharge in age group 30 to 39 are smear positive whereas 30% of women in age group are smear positive.

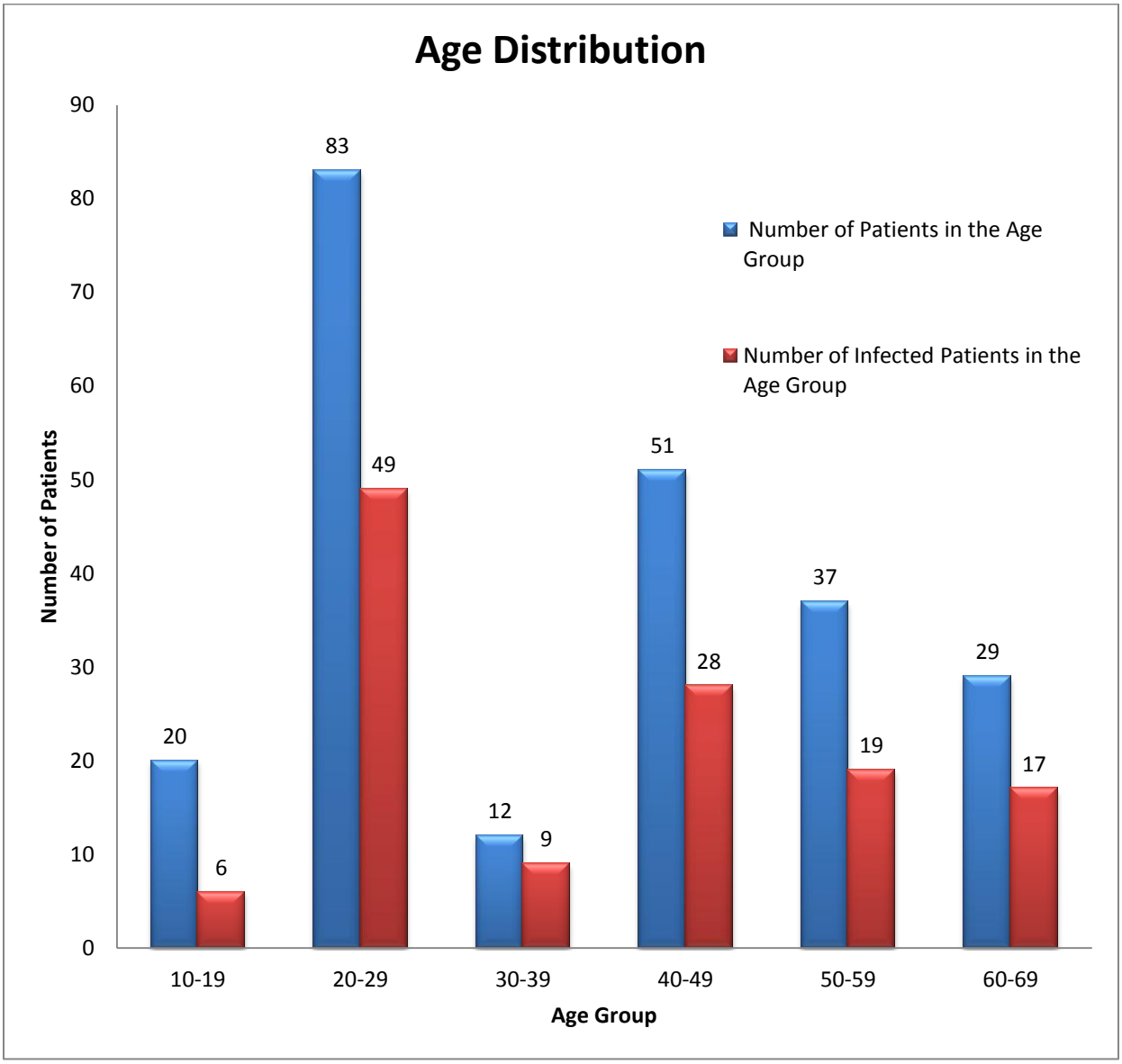

Figure 6: Age distribution of symptomatic and infection positive cases

Organism analysis by Age Group

Table 5 - Distribution of individual infections in the age groups

Age Group	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
10-19	2	4.2 %	3	8.8 %	0	0 %	0	0 %	2	9.1 %
20-29	24	50 %	10	29.4 %	15	46.9 %	5	62.5 %	12	54.5 %
30-39	3	6.3 %	1	2.9 %	2	6.3 %	1	12.5 %	2	9.1 %
40-49	10	20.8 %	13	38.2 %	5	15.6 %	0	0 %	3	13.6 %
50-59	4	8.3 %	5	14.7 %	5	15.6 %	2	25 %	3	13.6 %
60-69	5	10.4 %	2	5.9 %	5	15.6 %	0	0 %	0	0 %
Total	48		34		32		8		22	

Inference

- Prevalence of white discharge though low in age group 30 to 39, 75% of these patients harbor infection.
- Prevalence of white discharge is high in age group 20 to 29, and 59% of these patients harbor infection.
- Prevalence of infection in age group 60 to 69 also is high -58.6% next only to age group 20 to 29
- Of the 6 cases positive for infections in age group 20 to 29, 50%, (3) belonged to candida group.
- Of the 48 patients positive for Bacterial Vaginosis, 50% belonged to 20 to 29 age group.

- Of the 8 patients positive for gonorrhoea, 62.5% belonged to age group 20 to 29
- Of the 34 patients positive for candida 38.2%patients belonged to age group 40 to 49
- Of the 32 patients positive for trichomonas, 46.9% patients belong to age group 20 to 29%
- Of the 22 patients positive for Aerobic Vaginitis 54.5% belong to age group 20 to 29

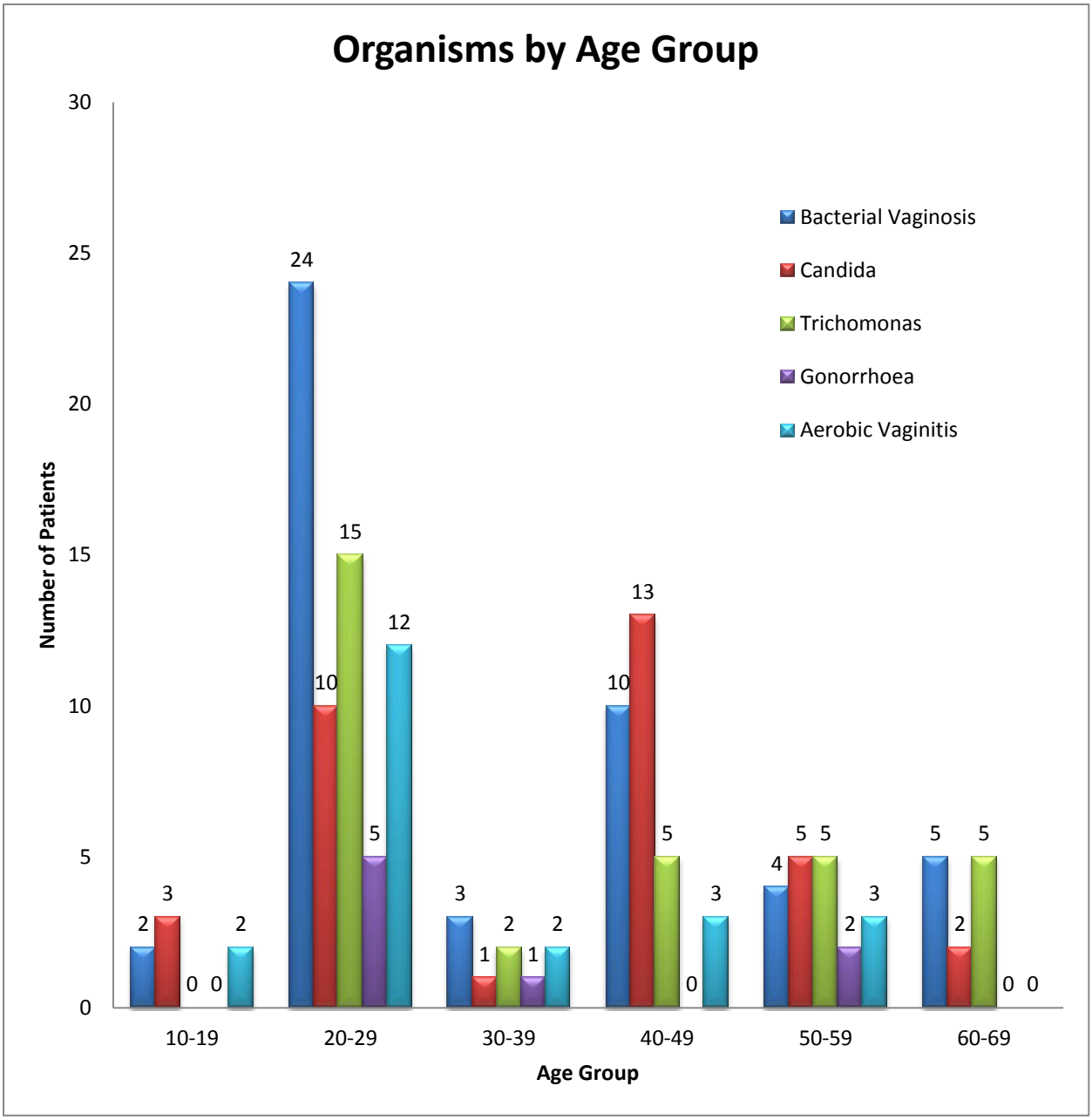

Figure 7: Distribution of individual infections in the age groups

Category Distribution

Table 6 - Distribution of symptomatic and infection positive cases in categories studied

Category	Number of Patients in the Category	Percentage of Patients in the Category	Number of Infected Patients in the Category	Percentage of Infected patients in the Category
1	20	8.6 %	6	30 %
2	95	40.9 %	58	61.1 %
3	69	29.7 %	38	55.1 %
4	48	20.7 %	26	54.2 %
Total	**232**		**128**	

Inference

- Of the patients with complaints of white discharge, maximum, belonged to the category of reproductive age women comprising 95 patients-40.9%
- Also 61.1% of patients with infections also belonged to this group.
- Prevalence of infection in perimenopausal and post menopausal age group are almost similar, 55.1% and 54.2% respectively.
- Only 30% of patients in pubertal group with complaints of white discharge were harbouring infections.

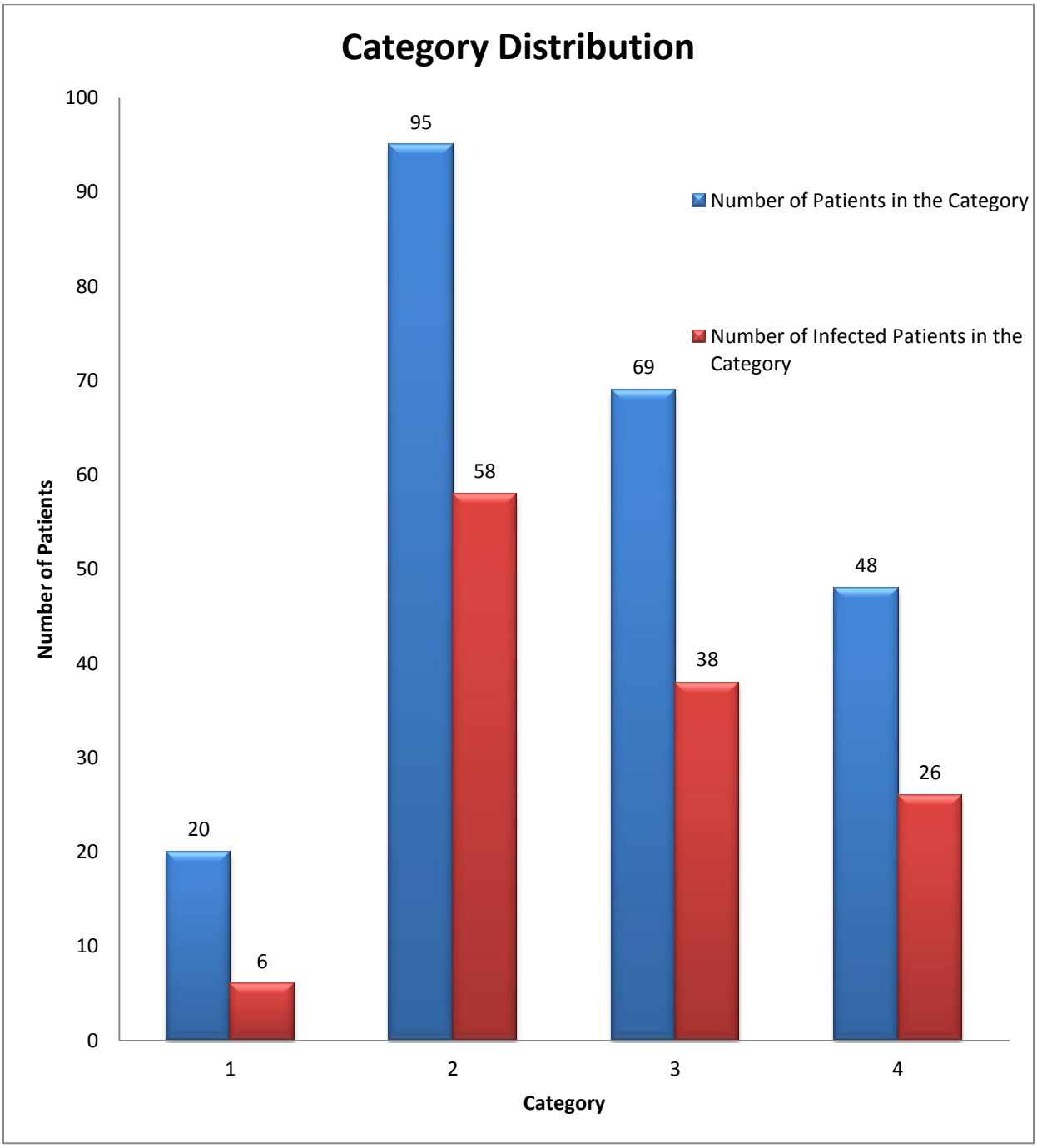

Figure 8: Distribution of symptomatic and infection positive cases in categories

Organism Analysis by Category

Table 7 - Distribution of individual infections in the categories studied

Category	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1	2	4.2 %	3	8.8 %	0	0 %	0	0 %	2	9.1 %
2	27	56.3 %	11	32.4%	17	53.1 %	6	75 %	14	63.6 %
3	11	22.9 %	17	50 %	8	25 %	1	12.5 %	5	22.7 %
4	8	16.7 %	3	8.8 %	7	21.9 %	1	12.5 %	1	4.5 %
Total	**48**		**34**		**32**		**8**		**22**	

Table 8: Statistical Analysis of individual infections in the categories

Organism	Chi Square Value	P Value
Bacterial Vaginosis	6.275	0.09
Candida	8.929	**0.03 (Significant)**
Trichomonas	4.859	0.183
Gonorrhoea	4.157	0.295
Aerobic Vaginitis	6.575	0.089

Inference

- Maximum prevalence of Bacterial Vaginosis in reproductive age category.

- Maximum prevalence of candida is in perimenopausal age group, ***association of Candida with perimenopausal age group is statistically significant.***
- Maximum prevalence of Trichomonas Vaginitis is in reproductive age category, 53.1
- Maximum prevalence of gonorrhoea is in reproductive age category, 75%
- Maximum prevalence of Aerobic Vaginitis is also in reproductive age group.
- Prevalence of Bacterial Vaginosis Trichomonas Vaginitis, and gonorrhoea are almost equal in perimenopausal and postmenopausal categories whereas prevalence of candida and Aerobic Vaginitis is high in perimenopausal category 50% vs. 8.8% and 22.7% vs. 4.5%

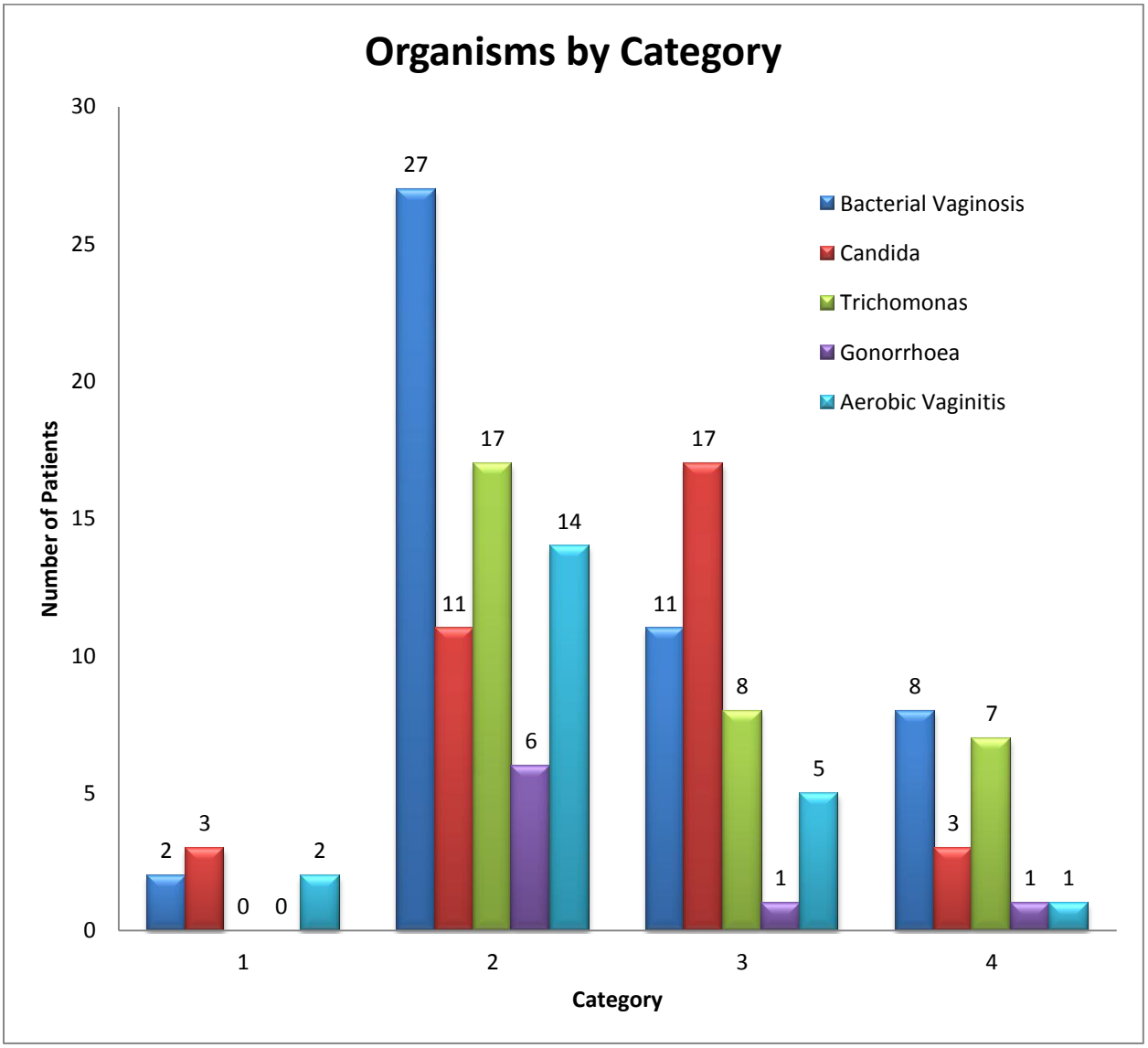

Figure 9: Distribution of individual infections in the categories

Marital Status Distribution

Table 9: Distribution of infection positive cases by Marital Status

Marital Status	Number of Patients in the Marital Status	Percentage of Patients in the Marital Status	Number of Infected Patients in the Status	Percentage of Infected patients in the Status
Married	212	91.4 %	122	95.3 %
Unmarried	20	8.6 %	6	4.7 %
Total	**232**		**128**	

Chi Square Value = 5.607

P Value = 0.01788

Inference

- Of the 128 patients who are positive for infections, 95.3% i.e. 122 patients belonged to married group.
- P value is < 0.05 - statistically significant.

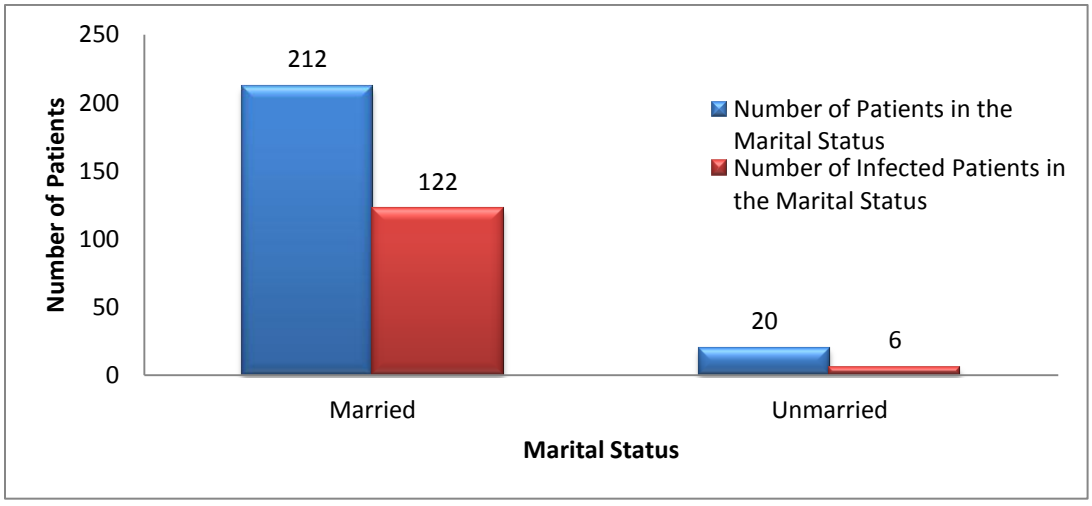

Table 10: Distribution of infection positive cases by Marital Status

5.6 Organism Analysis by Marital Status

Table 11: Distribution of individual infections by Marital Status

Marital Status	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Married	46	95.8 %	31	91.2 %	32	100 %	8	100 %	20	90.9 %
Unmarried	2	4.2 %	3	8.8 %	0	0 %	0	0 %	2	9.1 %
Total	**48**		**34**		**32**		**8**		**22**	

Inference

- All infections Bacterial Vaginosis, candida, Trichomonas, gonorrhoea and Aerobic Vaginitis have increased prevalence in married group.

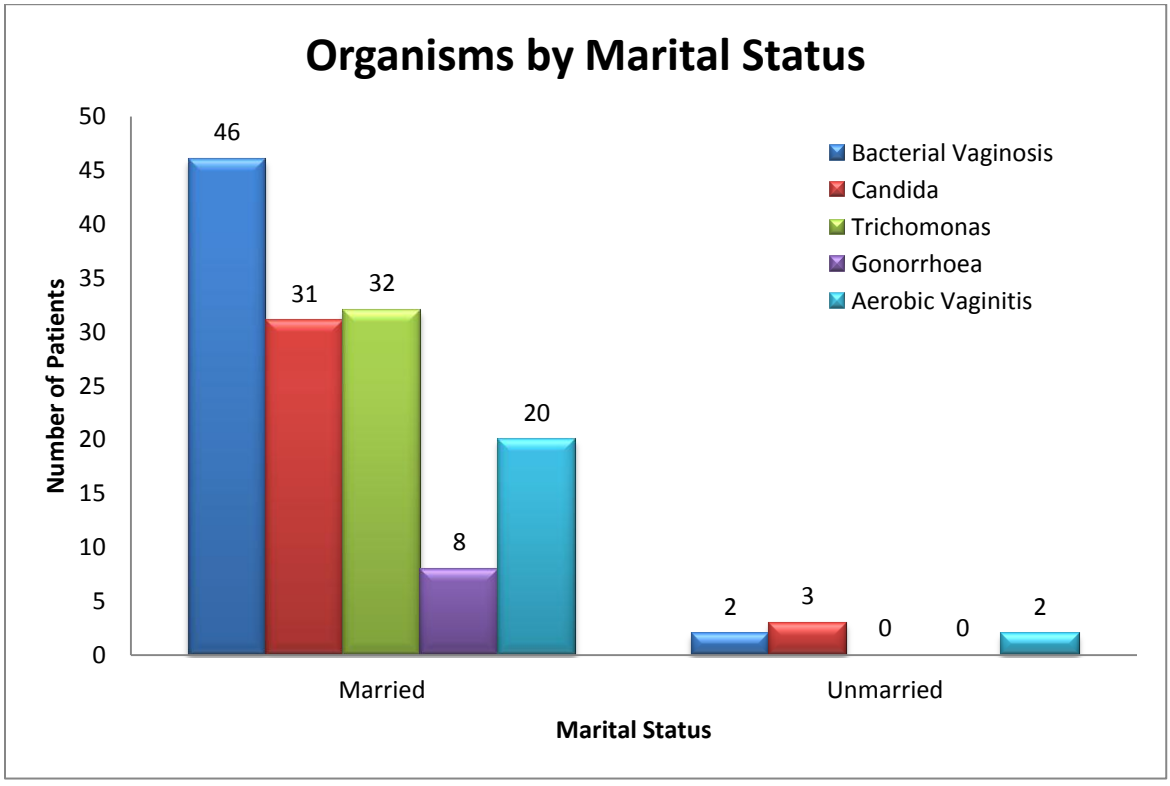

Figure 10: Distribution of individual infections by Marital Status

Pruritus Distribution

Table 12: association of infections with Pruritus

Pruritus	Number of Patients	Percentage of Patients	Number of Infected Patients	Percentage of Infected patients
With	72	31 %	49	68 %
Without	160	69 %	23	32 %
Total	232		72	

Chi Square Value = 66.85

P < 0.0000001 – statistically significant

Inference

- Of the 72 patients (31% of 232 patients with white discharge) with pruritus 49 patients (68%) are positive for infections.
- P value <0.05 statistically significant

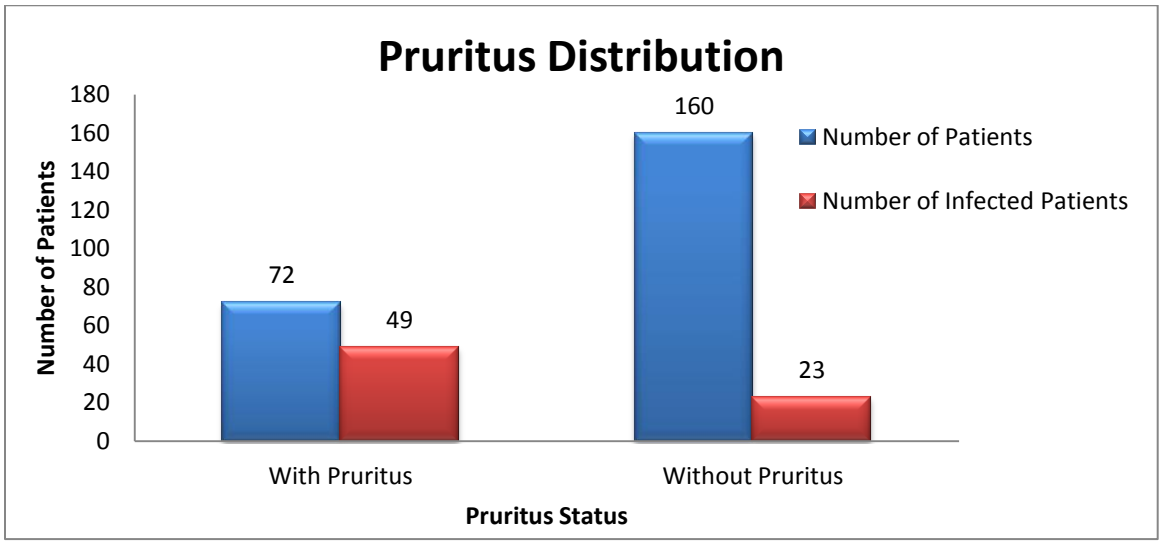

Figure 11: association of infections with Pruritus

Organism Analysis for Patients with Pruritus by Category

Table 13: Distribution of individual infections in patients with Pruritus

Category	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1	0	0 %	3	10.7 %	0	0 %	0	0 %	0	0 %
2	4	57.1 %	8	28.6 %	8	57.1 %	0	0 %	0	0 %
3	3	42.9 %	14	50 %	4	28.6 %	0	0 %	0	0 %
4	0	0 %	3	10.7 %	2	14.3 %	0	0 %	0	0 %
Total	7		28		14		0		0	

P value for candida – 0.01

Inference

- No patients with gonorrhoea and Aerobic Vaginitis have associated pruritus.
- Of the 49 patients with pruritus, 28 (57.1%)are positive candida
- 14.2% of infection positive patients and 28% of infection positive patients have associated pruritus.

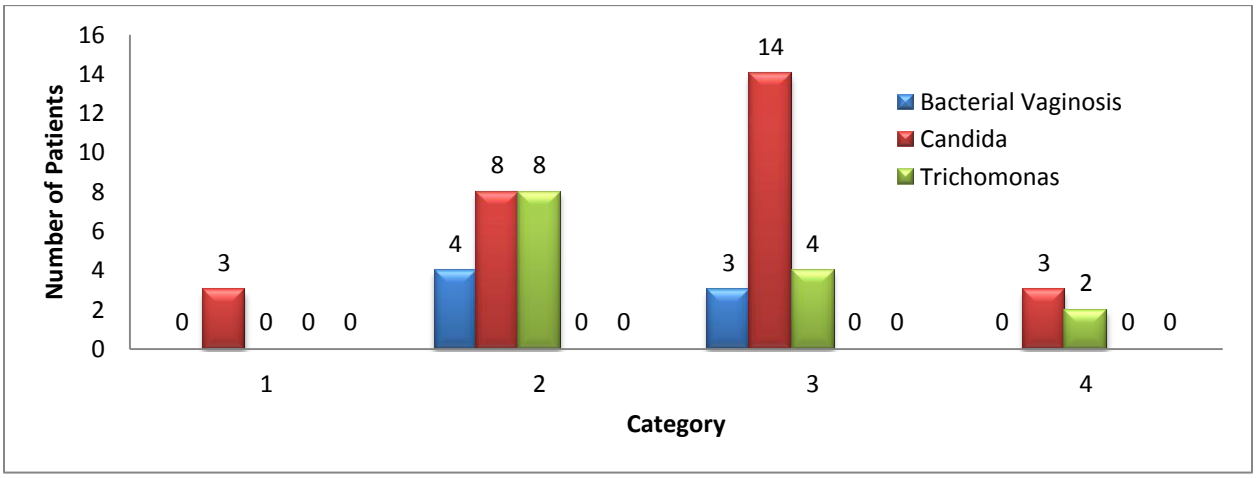

Figure 12: Distribution of individual infections in patients with Pruritus

UTI Distribution

Table 14: association of infections with Symptoms of UTI

UTI Symptoms	Number of Patients	Percentage of Patients	Number of Infected Patients	Percentage of Infected patients
With	24	10.3 %	19	14.8 %
Without	208	89.7 %	109	85.2 %
Total	232		128	

Chi Square Value = 6.231

P Value = 0.013

Inference

- Of the 232 patients with complaints of white discharge 24 have associated dysuria.
- Of the 24 patients with associated dysuria, 79.1% are positive for infections.
- P value is statistically significant

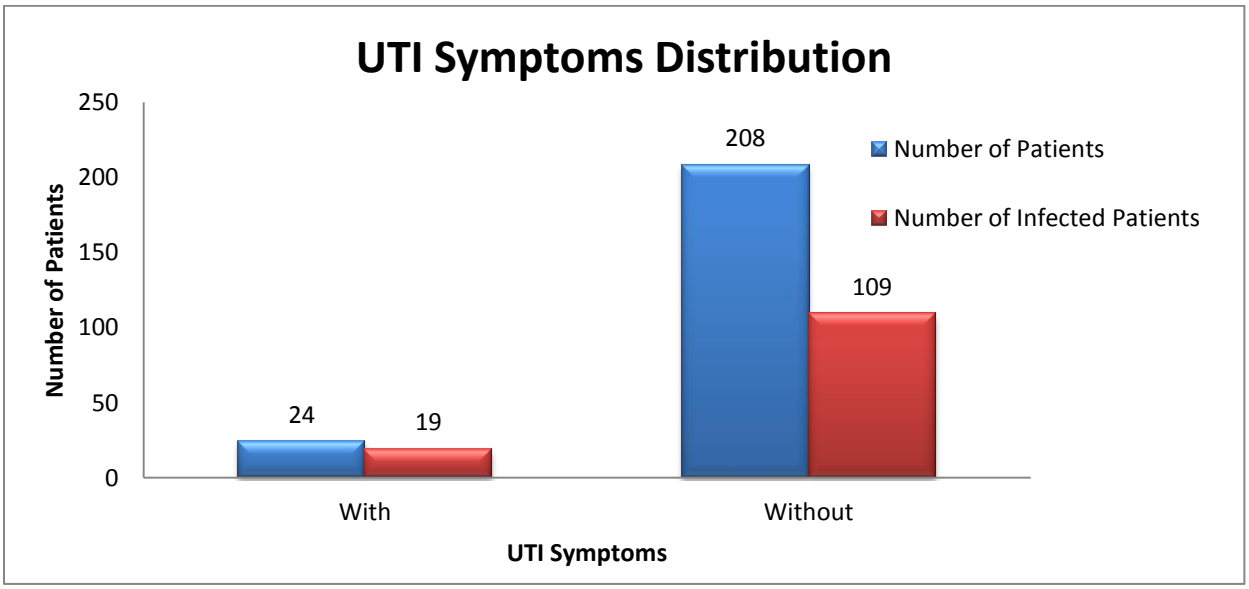

Figure 13: Distribution of infected patients with Symptoms of UTI

Organism Analysis for UTI Symptoms by Category

Table 15: Distribution of infection in patients with UTI Symptoms

Category	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1	0	0 %	1	11.1 %	0	0 %	0	0 %	0	0 %
2	3	50 %	3	33.3 %	2	66.7 %	0	0 %	2	66.7 %
3	1	16.7 %	3	33.3 %	1	33.3 %	0	0 %	1	33.3 %
4	2	33.3 %	2	22.2 %	0	0 %	0	0 %	0	0 %
Total	6		9		3		0		3	

Inference

- No patient with dysuria is positive for gonorrhoea
- 37.5% of patients with dysuria are positive for candida
- 25% of patients with dysuria are positive for Bacterial Vaginosis.
- Trichomonas Vaginitis and Aerobic Vaginitis are positive in 12.5% of patients with associated dysuria.

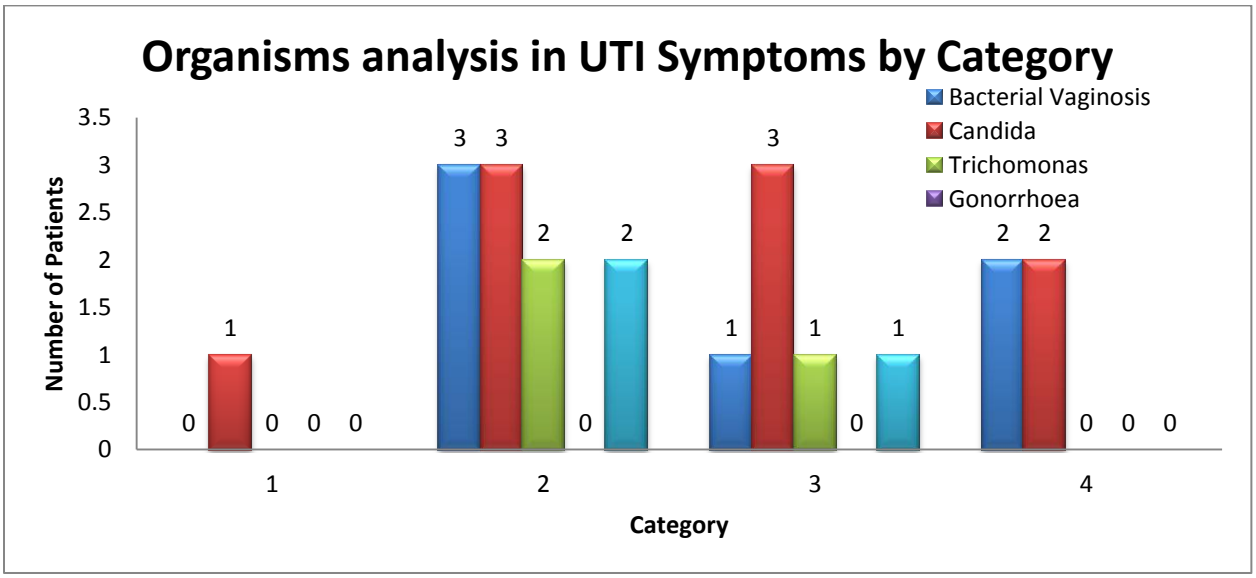

Figure 14: Distribution of infection in patients with UTI Symptoms

Diabetes Distribution

Table 16: association of infections with Diabetes

Diabetes	Number of Patients	Percentage of Patients	Number of Infected Patients	Percentage of Infected patients
With	17	7%	12	9.3%
Without	215	93%	116	90.7%
Total	232		128	

Chi Square Value = 1.763

P Value = 0.184

Inference

- Of the 17 patients who are positive with h/o diabetes mellitus, 12 patients 70.5% are positive for infections whereas only 53.9% of patients without diabetes are positive for infections.
- P value > 0.05, hence statistically significant.

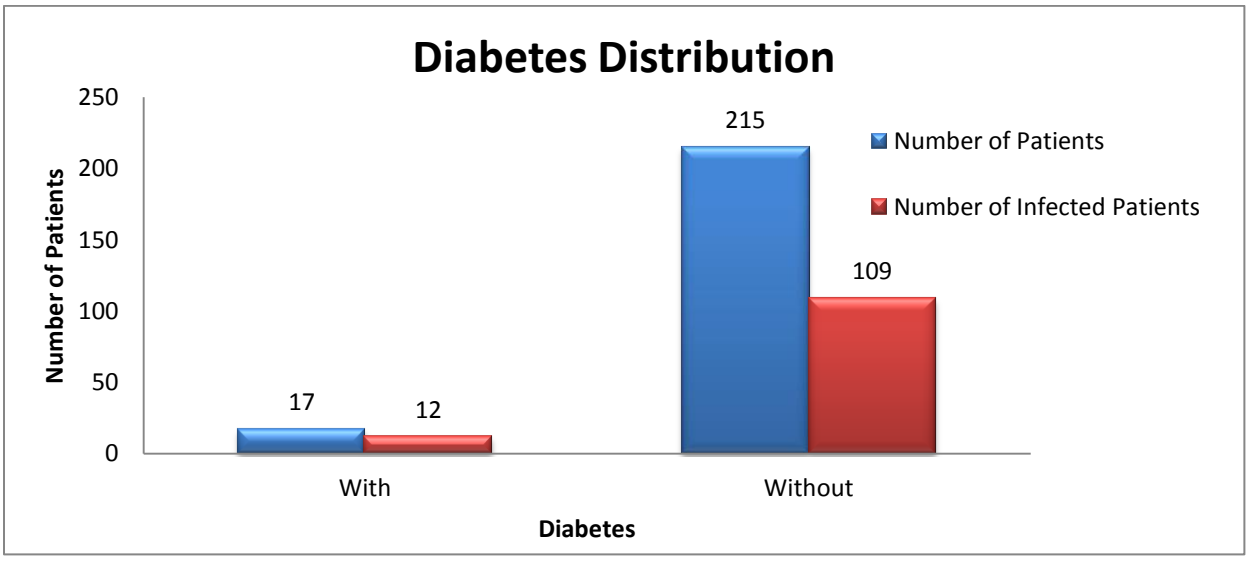

Figure 15: association of infections with Diabetes

Organism Analysis for Diabetes by Category

Table 17: Distribution of individual infection in patients with risk of Diabetes

Category	Bacterial Vaginosis		Candida		Trichomonas		Gonorrhoea		Aerobic Vaginitis	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
1	0		0		0		0		0	
2	2		2		0		0		0	
3	0		5		0		0		1	
4	1		3		0		0		0	
Total	3		10		0		0		1	

P value for candida-0.001

Inference

Of the total 14 cases with diabetes, 10 are positive for Candida i.e. 71.4%.

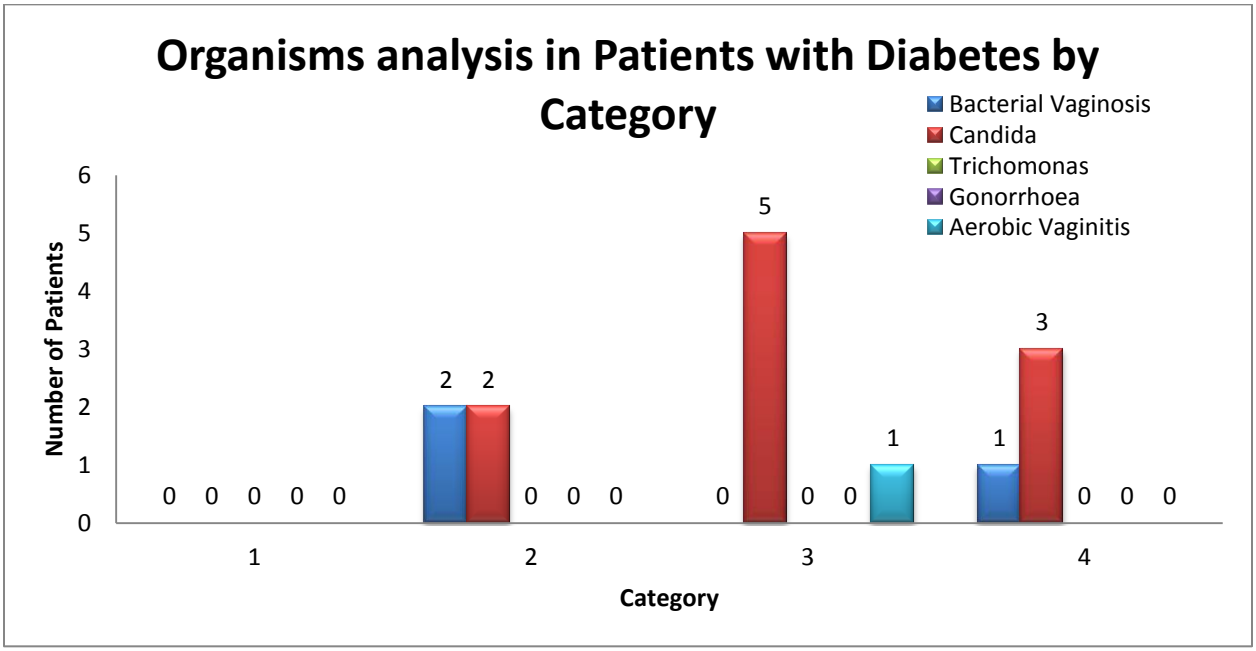

Figure 16: Distribution of individual infection in patients with risk of Diabetes

Mixed infection Analysis

Table 18: Distribution of patients with multiple infections by Category

Category	BV + CAND	BV + TV	BV + GON	BV + AV	CAND + TV	CAND + GON	CAND + AV	TV+ GON	TV + AV	GON + AV	BV + CAND + TV
1	0	0	0	0	0	0	0	0	0	0	0
2	4	8	0	7	1	0	0	0	0	0	1
3	0	2	0	2	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
Total	**4**	**10**	**0**	**9**	**1**	**0**	**0**	**0**	**0**	**0**	**1**

Inference

- Mixed infections are seen in 24 of total 128 infection positive patients (18.75%).
- Of this 41.6% is due the Bacterial Vaginosis and Trichomonas Vaginitis and 37.5% due to Bacterial Vaginosis and Aerobic Vaginitis.
- Mixed infection by Bacterial Vaginosis, Trichomonas Vaginitis and Aerobic Vaginitis is seen in one case. (4.1%)

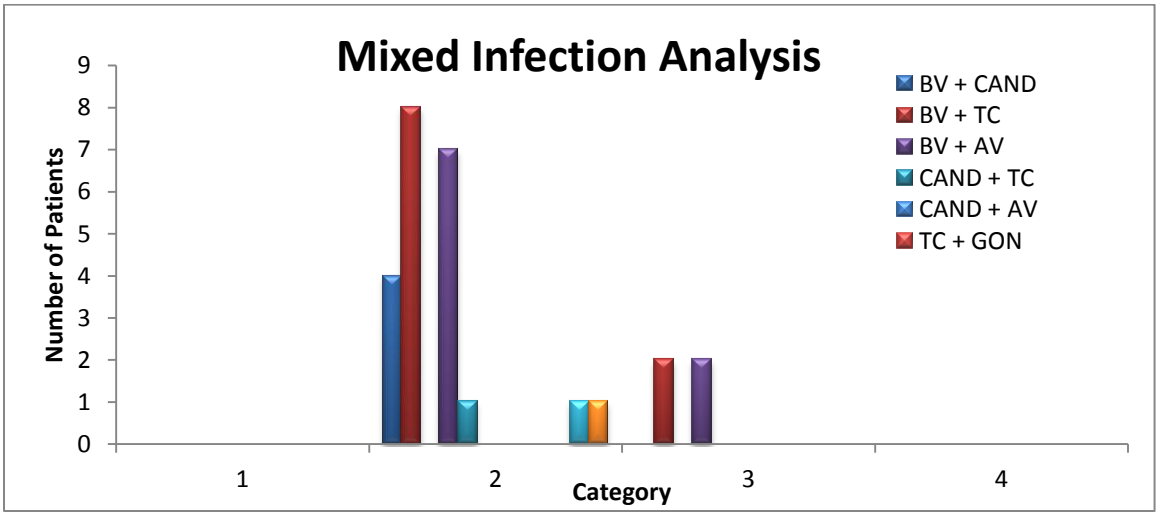

Figure 17: Distribution of patients with multiple infections by Category

Aerobic Vaginitis Analysis by Age Group

Table 19: Distribution of patients with Aerobic Vaginitis by Age Group

Age Group	Aerobic Vaginitis	
	Count	Percent
10-19	2	9.1 %
20-29	12	54.5 %
30-39	2	9.1 %
40-49	3	13.6 %
50-59	3	13.6 %
60-69	0	0 %
Total	22	

Inference

Of the 22 patients diagnosed as Aerobic Vaginitis, 12 belonged to the age group 20 to 29 (54.5%)

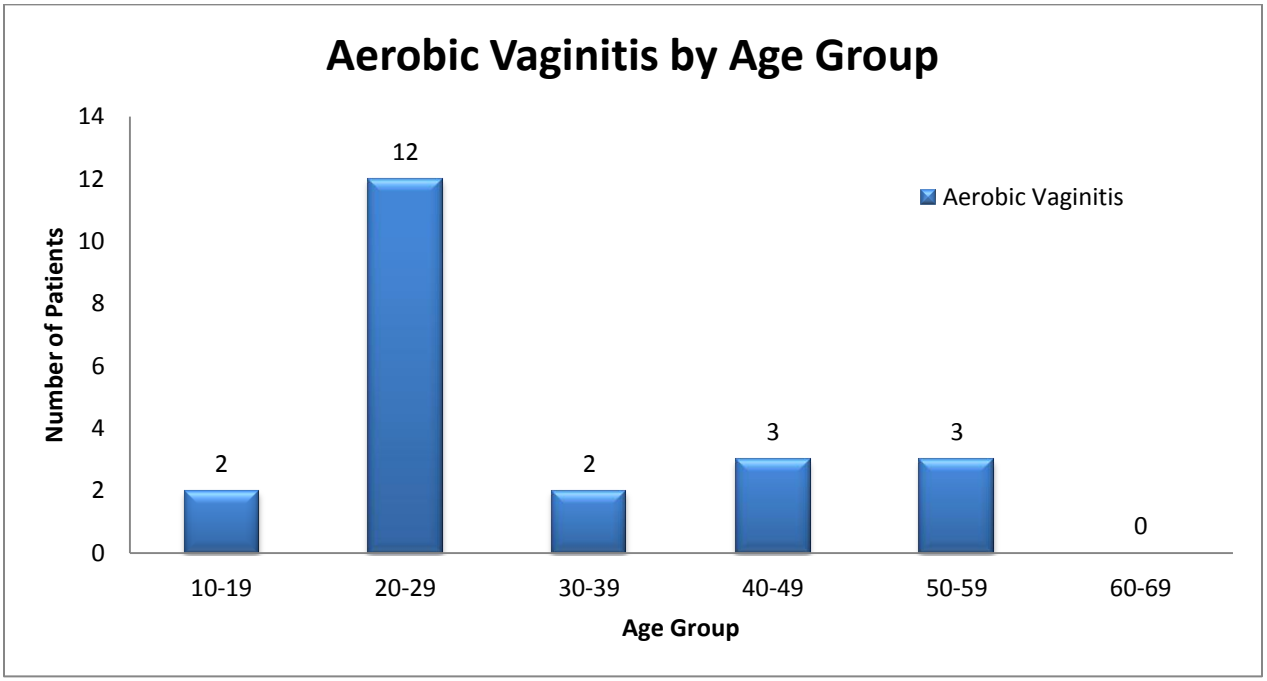

Figure 18: Distribution of patients with Aerobic Vaginitis by Age Group

Aerobic Vaginitis Analysis by Category

Table 20: Distribution of patients with Aerobic Vaginitis by category

Category	Aerobic Vaginitis	
	Count	Percent
1	2	9.1 %
2	14	63.6 %
3	5	22.7%
4	1	4.5 %
Total	22	

Inference

Of the 22 patients with Aerobic Vaginitis, 14 belonged to reproductive age category (63.6%)

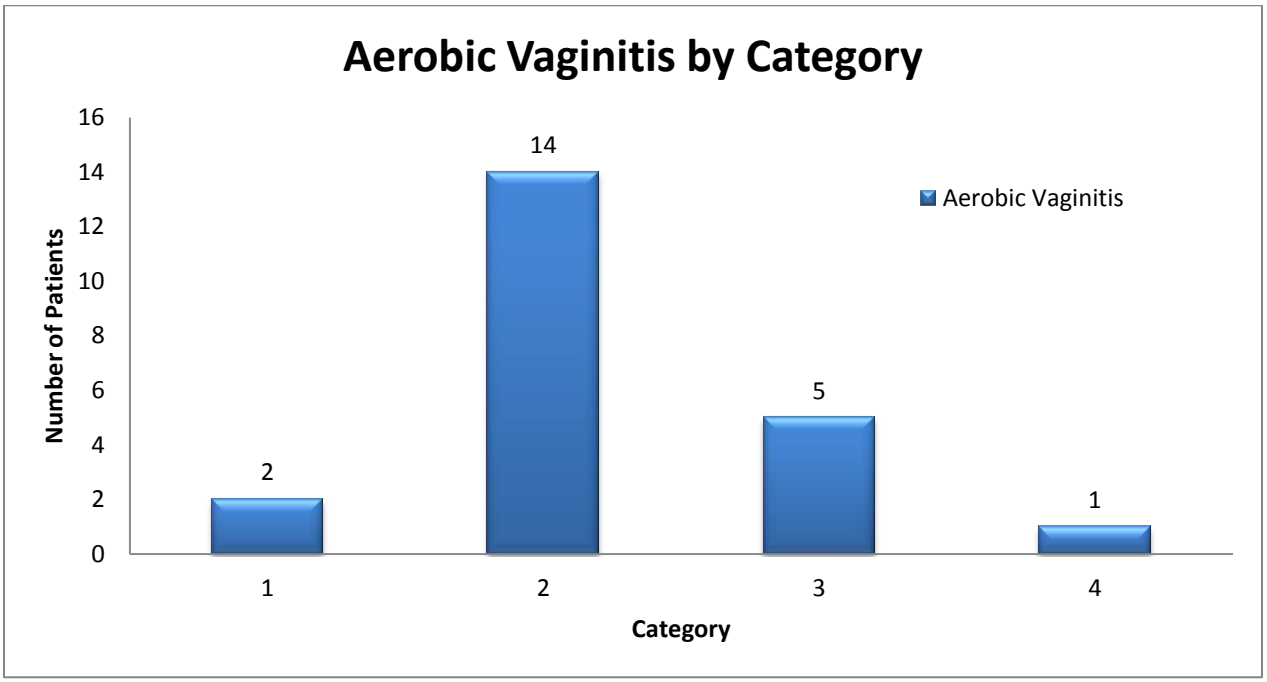

Figure 19: Distribution of patients with Aerobic Vaginitis by Category

Aerobic Vaginitis Analysis by Marital Status

Table 21: association of Aerobic Vaginitis with Marital Status

Marital Status	Aerobic Vaginitis	
	Count	Percent
Married	20	90.9 %
Unmarried	2	9.1 %
Total	**22**	

Chi Square Value = 1.153

P Value = 0.28 (not significant)

Inference

90.9% of patients with Aerobic Vaginitis belong to married group

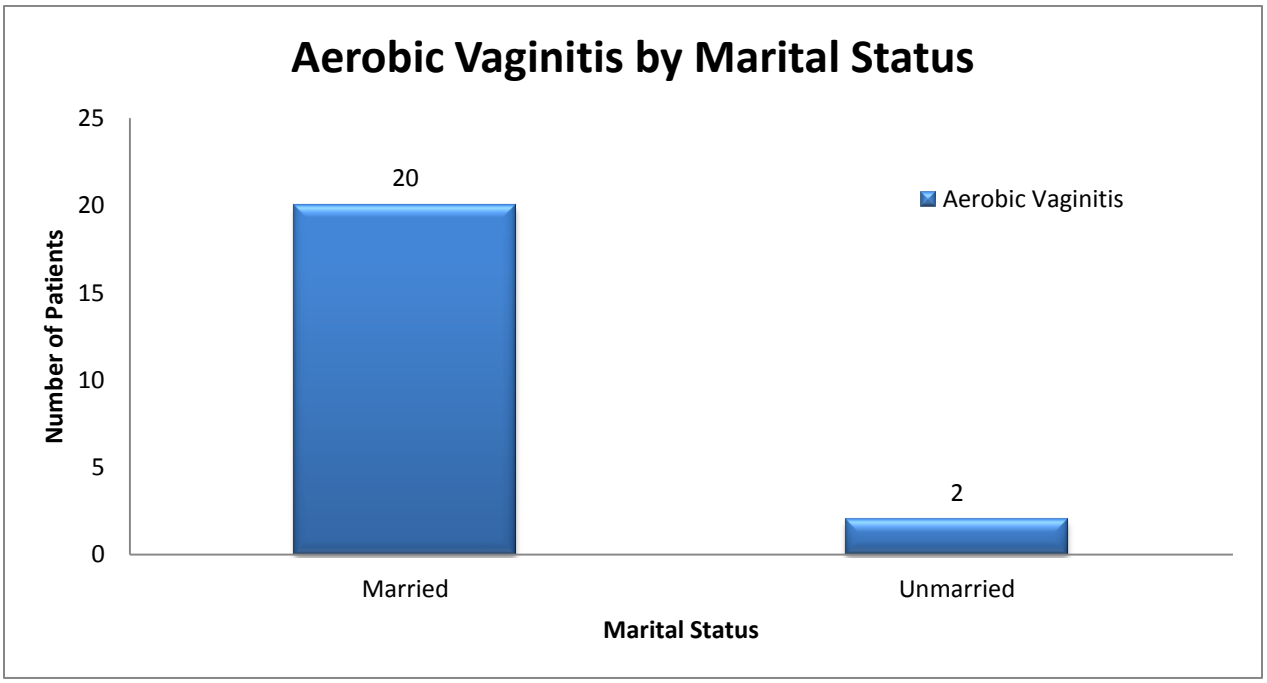

Figure 20 association of Aerobic Vaginitis with Marital Status

Aerobic Vaginitis in Patients with Pruritus by Category

Table 22: association of Aerobic Vaginitis s with Pruritus

Pruritus	Positive	Negative
With	0	72
Without	22	138
Total	22	210

Inference

No case of Aerobic Vaginitis complained of associated pruritus.

Aerobic Vaginitis in Patients with UTI Symptoms by Category

Table 23: association of Aerobic Vaginitis with UTI Symptoms

UTI Symptoms	Positive	Negative
With	3	16
Without	19	180
Total	22	196

Chi Square Value = 0.7447

P Value = 0.3882

Inference

- 3 out of 22 patients with Aerobic Vaginitis have associated UTI symptoms (13.6%)
- P value is statistically not significant

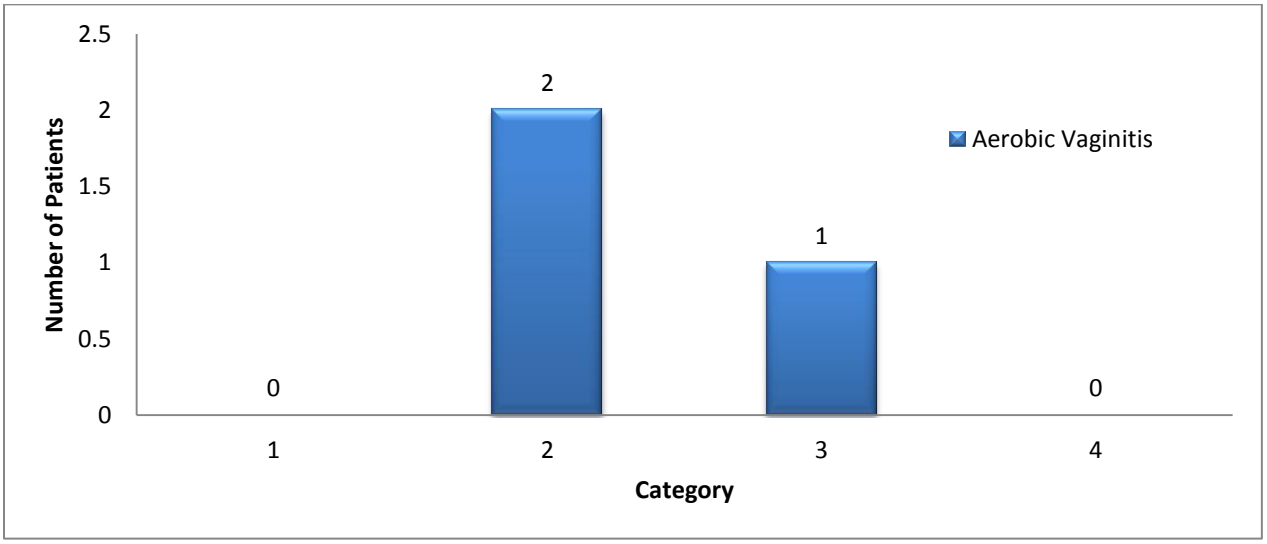

Figure 21: Distribution of Aerobic Vaginitis in patients with UTI Symptoms

Aerobic Vaginitis in Patients with Diabetes by Category

Table 24: association of Aerobic Vaginitis with Diabetes

Diabetes	Positive	Negative
With	1	11
Without	21	93
Total	22	104

Chi Square Value = 0.76

P Value = 0.3813

Inference

- One of 22 patients with Aerobic Vaginitis is positive for diabetes mellitus (4%)
- P value is not significant

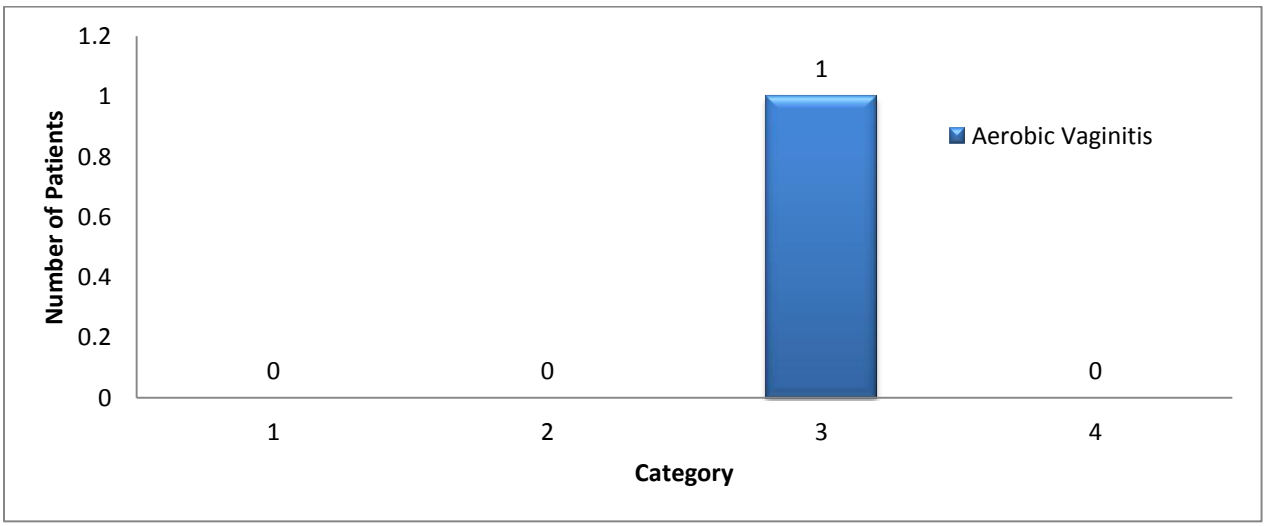

Figure 22: Distribution of Aerobic Vaginitis in patients with Diabetes

6. SUMMARY

- 55.1% of patients with white discharge are positive for infections.
- 35.8% of patients with white discharge belong to age group 20 to 29.
- 5.2% of patients with white discharge belong to age group 30 to 39.
- 38.2% of patients with infections belong to age group 20 to 29.
- 4% of patients with infections belong to age group 10 to19.
- Maximum prevalence of Bacterial Vaginosis, Trichomonas Vaginitis, gonorrhoea, Aerobic Vaginitis is seen in age group 20 to 29.
- Maximum prevalence is seen in patients aged 40 to 49.
- No case of gonorrhoea in age group 40 to 49 and 60 to 69.
- No case of Aerobic Vaginitis in age group 60 to 69.
- 40.9% of patients with white discharge belong to reproductive age category.
- 45.3% of patients positive for infections belong to reproductive age category.
- 4% of patients positive for infections belong to pubertal age category.
- 30% of patients in pubertal age category are positive infections.
- Prevalence of Bacterial vaginosis, Trichomonas Vaginitis, gonorrhoea and Aerobic Vaginitis infections is maximum in reproductive age group 56.3%,

53.1%, 75%, and 63.6% whereas prevalence of candidal vaginitis is maximum in perimenopausal category.

- No case of Trichomonas Vaginitis and gonorrhoea is seen in pubertal age group.
- 91.4% of patients with white discharge belong to married group.
- 95.3% of patients with infections belong to married group.
- No case of Trichomonas Vaginitis and gonorrhoea is seen in unmarried group.
- Presence of associated pruritus is significantly associated with infection positive cases.
- Presence of pruritus is significantly associated with Candida.
- Presence of UTI symptoms is significantly associated with infections.
- Individual organism association with UTI symptoms is not significant.
- Diabetes is not significantly associated with infection positive cases but it is significantly associated with Candida.
- Maximum prevalence of Aerobic Vaginitis is seen in age group 20 to 29, reproductive age category, married group.
- Apart from white discharge, Aerobic Vaginitis patients have presented with UTI symptoms yet it is not statistically significant. Also association of diabetes to Aerobic Vaginitis is also not significant.

7.DISCUSSION

- Prevalence of infections with white discharge in our study is 55.1% whereas in studies by Kulkarni et al[1], RD Catterall et al[10], Arsenilo Spinillo et al[8], prevalence of infections in patients with white discharge is around 30% - this may be due to the difference in the population under study, and most of these studies looking for prevalence are community based whereas our study is hospital based.
- Prevalence of gonorrhoea in our study sample is low – 6% which is similar to the study conducted by Abauleth et al[11] in Cocody University Hospital, Abidjan – 2.9% and study by Faye-ketteYH[10] et al in Ivory coast whereas in studies conducted by Mirza NB et al[9] at Nairobi, Kenya and Lobb et al[12] at Mauritania, the prevalence of gonorrhoea is high 26% and 64.4% respectively.
- There is no significant difference in the prevalence of Bacterial Vaginosis, candida and Trichomonas Vaginitis from the previous studies done elsewhere.
- Prevalence of infections is high in reproductive age, sexually active women similar to study by Arsenio Spinillo[3].

- Like in studies by Kulkarni et al[1] and Parashari et al[3], prevalence of infection is high in married group in our study.
- Prevalence of mixed infection in our study is 18.4% whereas in study by Mirza NB[9], it is 23%. But in study by RD Catteral[10] it is high – 74%
- Study by Donders et al[14] on Aerobic Vaginitis has shown that pruritus can be one of the complaints of patients with Aerobic Vaginitis, but in our study no patient with Aerobic Vaginitis has associated pruritus.
- Study by Donders et al[15] has also shown that mixed infection by Bacterial Vaginosis and Aerobic Vaginitis is common which is also seen in our study 37.5%

8. CONCLUSION

- Prevalence of Bacterial Vaginosis, gonorrhoea, Trichomonas Vaginitis and Aerobic Vaginitis is high in age group 20 to 29.
- Prevalence of Bacterial Vaginosis, Trichomonas Vaginitis, gonorrhoea and Aerobic Vaginitis is high in sexually active reproductive age women.
- Prevalence of candida is high in 40 to 49 age group.
- Prevalence of candida is high in perimenopausal women in whom the prevalence of diabetes is also high.
- Prevalence of infection in pubertal category is only 30%, and in perimenopausal and post menopausal category is around 50 %. Hence in these patients with white discharge proper examination and evaluation must be carried out to rule out non infectious causes of white discharge before initiating empirical antibiotic therapy.
- Prevalence of mixed infection is common.
- All 5 infections under study causing white discharge have high prevalence in married group. This can imply that sexual exposure is a risk factor for vaginal infections along with other factors like menstruation, obstetric trauma.

- If associated symptoms like pruritus and UTI symptoms are present, the probability of them harbouring infections is also high.
- Presence of pruritus is significantly associated with candida infection.
- UTI symptoms prevalence is high in Bacterial Vaginosis patients but it is not statistically significant.
- Presence of diabetes is significantly associated with candidal infection.
- Aerobic vaginitis
    - High prevalence in age group 20 to 29
    - High prevalence in sexually active reproductive age women
    - High prevalence in married women
    - May be associated with UTI symptoms- not statistically significant
    - Our study reveals no association between pruritus and Aerobic Vaginitis
    - No statistically significant association between presence of diabetes and Aerobic Vaginitis.
    - Mixed infection with Bacterial Vaginosis is common.

ANNEXURE I - BIBLIOGRAPHY

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ANNEXURE II - MASTER CHART

S. No	NAME	AGE	AGE GROUP	CATEGORY	MARITAL STATUS	OBSTETRIC SCORE	UTI SYMPTOMS	PRURITUS	DIABETES	ORGANISMS	BV	CV	TV	G	AV	BV + CV	BV + TV	BV + G	BV + AV	CV + TV	CV + G	CV + AV	TV + G	TV + AV	G + AV
1	Seetha lakshmi	23	2	2	1	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Asha	46	4	3	1	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Nithya	25	2	2	1	2	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	Vidhya	26	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Anitha	21	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Vasanthi	49	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Radhika	46	4	3	1	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Fathima	21	2	2	1	2	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
9	lakshmi	60	6	4	1	6	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
10	Vinitha	26	2	2	1	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Devi	27	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	Gowri	48	4	3	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Kuppammal	58	5	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	Nalini	31	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Saraswathy	50	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Sasikala	51	5	3	1	2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
17	Saritha	25	2	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Manonmani	49	4	3	1	4	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Ezhilarasi	26	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

20	Sivasankari	45	4	3	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Priscella	22	2	2	1	2	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
22	Divyadarshini	13	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Sathyajothi	24	2	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
24	manjula	47	4	3	1	3	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Sheela	48	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	Bhuvaneshwari	61	6	4	1	4	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Devi	27	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	manjula	45	4	3	1	2	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
29	Senthamarai	49	4	3	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	Amudha	59	5	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	Noorjahan	23	2	2	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	Suganya	50	5	3	1	2	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
33	Ezhilarasi	16	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	Pramila	51	5	3	1	3	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
35	Sengammal	57	5	4	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Jeya	21	2	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Devi	58	5	4	1	3	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
38	Maheshwari	28	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	Rani	65	6	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	Dhanalakshmi	29	2	2	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
41	Munyammal	22	2	2	1	1	0	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
42	Kavitha	47	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	Sujatha	34	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	Salarathi	67	6	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	Sasirekha	49	4	3	1	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	Sangeetha	32	3	2	1	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
47	Kanchana	24	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Lalitha	25	2	2	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
49	Saranya	16	1	1	0	9	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

50	Durga	48	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	Latha	26	2	2	1	1	1	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
52	Vanitha	15	1	1	0	9	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
53	Mahalakshmi	22	2	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	RAni	45	4	3	1	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
55	Maheshwari	21	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	Geetha	26	2	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	Alifathima	25	2	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
58	Mutamilselvi	69	6	4	1	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
59	Elakiya	16	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	Sivagami	23	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	Kavitha	16	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	Meena	46	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	Padmavathy	24	2	2	1	2	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
64	Jayalalitha	21	2	2	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	Vasanthi	51	5	3	1	2	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
66	Ganga	46	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	devagi	63	6	4	1	3	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
68	Sindhu	16	1	1	0	9	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
69	Valliammal	59	5	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	Kumari	28	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	Devika	30	3	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
72	Chitra devi	31	3	2	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
73	Tamilarasi	24	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	Ganga	61	6	4	1	2	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	Jothilakshmi	48	4	3	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	Nagammal	59	5	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	Mariammal	24	2	2	1	1	0	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0
78	Sarala	47	4	3	1	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
79	Girija	26	2	2	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

80	Dhanalakshmi	65	6	4	1	4	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	Sujatha	49	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	Gomathy	28	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	Kanmani	45	4	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	Abitha	46	4	3	1	4	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	Kanchana	51	5	3	1	5	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
86	Sheeba	50	5	3	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	Ramya	21	2	2	1	3	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
88	Barani	24	2	2	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	Anitha	25	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	Sarala	69	6	4	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	karpagam	68	6	4	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	Girija	24	2	2	1	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
93	Nadhiya	23	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	Pazhaniammal	65	6	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	Narmadha	33	3	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	Visalakshi	28	2	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	Vijaya	27	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	Kavitha	68	6	4	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	Dillirani	49	4	3	1	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
100	Mohana	21	2	2	1	2	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
101	Nagarani	23	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	SAranya	47	4	3	1	4	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
103	Sarala	48	4	3	1	4	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
104	Kasthuri	65	6	4	1	3	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
105	Lakshmi	25	2	2	1	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
106	Mubarack	60	6	4	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107	Chithra	29	2	2	1	2	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
108	Kanimozhi	47	4	3	1	2	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
109	Hemalatha	45	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

110	Jeyanthi	46	4	3	1	3	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
111	Annalakshmi	33	3	2	1	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
112	Durga devi	31	3	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113	selvi ammal	28	2	2	1	2	0	1	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
114	Pushpa mary	58	5	4	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	Jansi rani	49	4	3	1	3	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
116	Nagammal	27	2	2	1	3	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
117	Asifa	62	6	4	1	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118	Jasleena banu	20	2	2	1	4	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
119	saroja	45	4	3	1	3	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
120	Solai	60	6	4	1	4	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
121	Deepa	48	4	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122	Anitha	47	4	3	1	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123	Jebaselvi	21	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124	Kavitha	27	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125	Sasikala	58	5	4	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
126	Sangeetha	24	2	2	1	1	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
127	Seema	31	3	2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128	Arulkumari	51	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	Govindammal	65	6	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	Neelavathi	28	2	2	1	2	0	1	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
131	Sundari	50	5	3	1	3	0	1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
132	Lavanya	15	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133	Radha	26	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134	priya	14	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	Selvi	48	4	3	1	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
136	Sathya	49	4	3	1	3	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
137	Bagyalakshmi	24	2	2	1	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
138	Bindu	22	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139	Sheela	63	6	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

140	Sedhulakshmi	50	5	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141	Kavitha	21	2	2	1	2	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
142	Asha	65	6	4	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	Hemavathy	68	6	4	1	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144	Sasikala	27	2	2	1	3	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
145	Manimala	65	6	4	1	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
146	hema	50	5	3	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
147	Govindammal	26	2	2	1	2	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
148	Kantha	47	4	3	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149	Seetha	48	4	3	1	4	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
150	Ganga	29	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
151	sunmathi	62	6	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152	Ranjitha	49	4	3	1	2	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
153	Priya	26	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
154	Anandhi	49	4	3	1	3	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
155	Stellamary	48	4	3	1	4	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
156	Kalaiarasi	50	5	3	1	4	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
157	Suganya	25	2	2	1	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
158	Barathi	14	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	latha	61	6	4	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160	Maheshwari	51	5	3	1	3	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
161	Malathy	34	3	2	1	2	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
162	Chellammal	59	5	4	1	2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
163	Dairu nishA	58	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164	Sangeetha	35	3	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165	mala	31	3	2	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
166	Gomathy	57	5	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167	chitra	46	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168	Muneeswari	28	2	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169	Ambika	59	5	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

170	Geetha	29	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171	Ponmozhi	26	2	2	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
172	Kasthuri	61	6	4	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173	nagarani	60	6	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174	Kuppammal	68	6	4	1	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175	kamatchi	46	4	3	1	3	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
176	Sumitha	15	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177	Kanmani	16	1	1	0	9	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
178	Nandhini	25	2	2	1	2	0	1	0	1	1	1	1	0	0	1	1	0	0	1	0	0	0	0	0
179	Renuka	51	5	3	1	3	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
180	Munishmary	60	6	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
181	Pavithra	24	2	2	1	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
182	Radha	50	5	3	1	2	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
183	Poongothai	56	5	4	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
184	Muniyammal	57	5	4	1	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185	Shameela	22	2	2	1	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
186	Devi	49	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187	Radhika	47	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
188	Nirosha	16	1	1	0	9	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189	Saritha	21	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190	prema	53	5	4	1	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
191	Andal	46	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192	Priyanka	15	1	1	0	9	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
193	kamala	20	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194	kanchana	61	6	4	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195	Barathy	59	5	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
196	Kala	45	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197	Saritha	24	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198	rani ammal	49	4	3	1	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199	Sangeetha	25	2	2	1	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

200	manjula	23	2	2	1	2	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
201	kalavathy	46	4	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202	thangam	21	2	2	1	2	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
203	seetha	20	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
204	priya	13	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
205	Rathinam	57	5	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206	chithra	29	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
207	ganga	48	4	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208	radha	26	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
209	vennila	14	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
210	porkalai	23	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211	banu	16	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
212	senbagam	48	4	3	1	2	1	1	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
213	kavitha	22	2	2	1	2	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
214	rajathi	26	2	2	1	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
215	ambujam	57	5	4	1	3	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
216	nayagi	46	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
217	nisha	24	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218	priyanka	15	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	rajammal	52	5	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
220	kumudha	21	2	2	1	2	0	1	0	1	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
221	sumathi	51	5	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
222	mary	27	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223	kaveri	15	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
224	vijaya	26	2	2	1	2	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
225	selvakani	48	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226	Saroja	59	5	4	1	3	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227	arumai kani	24	2	2	1	2	1	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
228	vanitha	22	2	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
229	vadivammal	60	6	4	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

230	sathya	16	1	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
231	umayal	48	4	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
232	Pazhaniyammal	56	5	4	1	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

ANNEXURE III - KEY TO MASTER CHART

AGE GROUP

1 – 10 to 19 years

2 – 20 to 29 years

3 – 30 to 39 years

4 – 40 to 49 years

5 – 50 to 59 years

6 – 60 to 69 years

CATEGORY

1 – Attained Menarche, Less than 18 years, No sexual exposure

2 – 18 to 35 years with sexual activity

3 – Perimenopausal age group, 45 to 52 years

4 – Post menopausal women, 1 year after the cessation of menses

ORGANISMS

BV – Bacterial Vaginosis

CV – Candida

TV – Trichomonas Vaginitis

G – Gonorrhoea

AV – Aerobic Vaginitis

ANNEXURE IV – PROFORMA

NAME :

AGE :

ADDRESS :

OP NO :

DATE OF VISIT :

HISTORY OF PRESENTING COMPLAINT:

DURATION :

QUANTITY :

COLOUR :

SMELL :

ASSOCIATED SYMPTOMS :

COITAL HISTORY :

DURATION OF SEXUALLY ACTIVE LIFE:

LAST COITAL HISTORY :

HISTORY OF SIMILAR COMPLAINT IN THE PARTNER:

IF YES, DETAILS :

OBSTETRIC HISTORY :

USE OF IUD :

HISTORY OF DIABETES :

OTHER MEDICAL ILLNESS :

HISTORY OF DRUG INTAKE :

HISTORY OF RECENT SURGERIES:

GENERAL EXAMINATION :

VITALS :

SYSTEMIC EXAMINATION :

CARDIOVASCULAR SYSTEM :

RESPIRATORY SYSTEM :

CENTRAL NERVOUS SYSTEM :

ABDOMINAL EXAMINATION :

LOCAL EXAMINATION :

SPECULUM EXAMINATION :

PELVIC EXAMINATION :

PAP SMEAR :

VAGINAL DISCHARGE FOR MICROBIAL STUDY:

RANDOM BLOOD SUGAR :

Signature of Investigator: Signature of Guide:

ANNEXURE V – LETTER OF CONSENT

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு : An epidemiological analysis of abnormal vaginal discharge in patients attending gynaec OP, KMCH

Department of Obstetrics and Gynaecology, KMCH

பங்கு பெறுபவரின் பெயர் :

பங்கு பெறுபவரின் வயது : **பங்கு பெறுபவரின் எண் :**

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. நான் இவ்வாய்வில் தன்னிச்சையாக பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளல்லாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக் கொள்ள மறுக்கமாட்டேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக் கொள்கிறேன். இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன்.

பங்கேற்பவரின் கையொப்பம் சாட்சியாளரின் கையொப்பம்

இடம் : இடம் :

தேதி : தேதி :

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் :

ஆய்வாளரின் கையொப்பம் :

இடம் : தேதி :

ANNEXURE VI - GLOSSARY

Abbreviation	Description
CDC	Centre for Disease Control
DM	Diabetes Mellitus
E. coli	Escherichia Coli
ELISA	Enzyme Linked Immuno Sorbent Assay
HIV	Human Immuno-deficiency Virus
HPV	Human Papilloma Virus
IUCD	Intra Uterine Contraceptive Device
KOH	Potassium Hydroxide
OP	Out Patient
PID	Pelvic Inflammatory Disease
PV	Per Vaginal Examination
UTI	Urinary Tract Infection

ANNEXURE VII – ETHICAL COMMITTEE APPROVAL

INSTITUTIONAL ETHICAL COMMITTEE
GOVT.KILPAUK MEDICAL COLLEGE,
CHENNAI-10
Ref.No.9677/ME-1/Ethics/2012 Dt:01.11.2012.
CERTIFICATE OF APPROVAL

The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "A Study on an epidemiological analysis of abnormal vaginal discharge in patients attending gynaec OP, KMCH"- For Dissertation Pupose submitted by Dr.Vidhya, MS (O&G), PG Student, KMC, Chennai-10.

The Proposal is APPROVED.

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

GOVT. KILPAUK MEDICAL COLLEGE
01 DEC 2012
Kilpauk, Chennai-10.

CHAIRMAN, 1/12/12
Ethical Committee
Govt.Kilpauk Medical College,Chennai

ANNEXURE VIII – PLAGIARISM REPORT